

HITCHCOCK'S *Machine Tool* **BLUE BOOK**

FOUNDED

MAY 1940

1905

HARDINGE *HIGH SPEED* PRECISION LATHE

THE performance of Hardinge Precision Lathes has earned for them an enviable reputation as indispensable equipment for production, tool room, laboratory and experimental departments.

Their design, quality of workmanship, ease of operation, accuracy, durability and interchangeability of attachment will appeal to you.

• Write for Bulletin BB which gives complete details.

PIONEERED by Hardinge, the modern pedestal unit combines utility with appearance and definitely contributes to efficiency in operation.

Specifications—1" collet capacity, 9" swing, 36" bed. Spindle speeds .. 8 forward and 8 reverse from 230 to 3900 R.P.M.

ILLUSTRATING ACCESSORY COMPARTMENT DRIVING UNIT AND STORAGE COMPARTMENT FOR COLLETS AND ATTACHMENTS.

HARDINGE BROTHERS, Inc., ELMIRA, N. Y.

CHICAGO

NEW YORK

HARTFORD

PHILADELPHIA

CLEVELAND

DETROIT

1890

HARDINGE GOLDEN ANNIVERSARY YEAR

1940

HERE is one of 100 uses

*Blade tilted
to 45° for
mitering*



on a truly universal metal cutting band saw—a mitre cut at 45° through an 18" I beam.

Work always remains stationary. The column is mounted in a traveling ball bearing carriage that feeds the blade through the work.

Straight cutting, cutting angles, mitres, notching and coping are a few of the many jobs which may be done fast and accurately with this large (18"x18") MARVEL Band Saw.

MARVEL No. 8 METAL CUTTING BAND SAW

Save machining time, save roughing-out time, save many hours on many jobs with this versatile saw—a machine that will give accurate dependable service, on delicate small work as well as on large bars and structural shapes.

ARMSTRONG-BLUM MFG. CO.

"The Hack Saw People"

5741 Bloomingdale Ave., Chicago, U.S.A.
Eastern Sales Office: 199 Lafayette St., New York

*Blade vertical
for square
cutting.*



Profit by REMOTE CONTROL



THE BIGGEST IMPROVEMENT IN WELDING in years *Finger Tip*

Control at the Work Speeds Production... Improves Welds. Prove It With 30 Days Trial At Our Risk.

● With the Hobart Remote Control at his finger tips, the operator can control his work with 100 fine adjustments. Not only does this save time and money, but removes the temptation to "get by" with improper arc adjustments. Hobart's new "Multi-Range" Dual Control is another Hobart feature that makes better quality welding possible. These 2 exclusive Hobart advantages save time and cut costs.

Prove it in your shop with

30 DAYS TRIAL

Try a Hobart in your shop at our risk to prove it will soon pay for itself. No obligation.

HOBART BROS. CO., Box TB-540, Troy, Ohio

"One of the World's Largest Builders of Arc Welders."

HOBART



FREE BOOKS

☐ How Hobart Controls
☐ New Trends in Arc Welding

Hobart Bros. Co., Box TB-540, Troy, O.

Send full information about the new Hobart multi-range Arc Welder, particularly on the items checked below:

☐ Electric Drive ☐ Gas Drive ☐ Build Your Own

I'm interested in _____ Amp. capacity.

To be used for _____

Also information on ☐ Easy-to-Own Terms ☐ 30 Days Trial ☐ Renting with purchase privilege

NAME _____

ADDRESS _____

CITY _____

FIRM _____

STATE _____

Spring tempered COLLETS

Order From Stock

Scientifically heat treated to a true spring temper, "Rivett Mark" collets resist wear and hold their spring longer than collets of any other make. As standard equipment on all makes of lathes and millers, (see Rivett Bulletin 1008) they may be ordered for immediate delivery from the following stocks:—

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R. E. Ellis Engineering Co.
545 W. Washington Blvd.

DETROIT

Charles A. Strelinger Co.
149 E. Larned Street

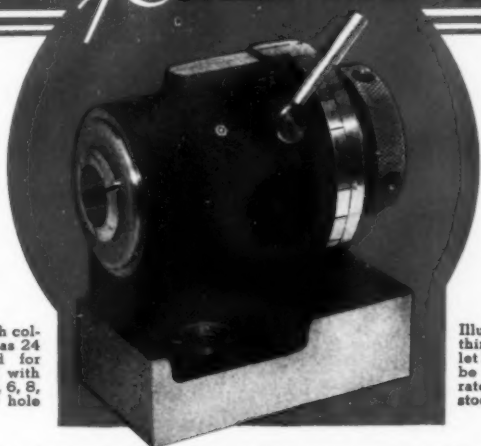
BOSTON

Rivett Lathe & Grinder Inc.
18 Riverview Road, Brighton



RIVETT LATHE & GRINDER INC.
BRIGHTON, BOSTON, MASS.

Hardinge COLLET INDEX FIXTURE



1" capacity through collet. Index Plate has 24 holes. Furnished for other collets and with either a 2, 3, 4, 5, 6, 8, 10, 12, 15 or 30 hole Index Plate.

Illustration is one-third actual size. Collet Index Fixture can be purchased separately or with a Tailstock and Sub-Base.

■ ACCURACY-LOW COST-TIME SAVING-CAPACITY-ADAPTABILITY ■

Practical time saving applications make the use of the Hardinge Collet Index Fixture essential in the modern tool room and production departments. Besides being an economical means for holding work, it offers the feature of rapid and accurate indexing. Miller and grinder applications are shown. The Hardinge Collet Index Fixture can also be used with a shaper or a drill press—you will find many more uses in your particular line of work. ***It is no longer necessary for your operators to make expensive holding devices for different applications.***

The Hardinge Collet Index Fixture can be held in a vise, on a magnetic chuck or bolted to the table of any machine. It is used for milling keyways, punches, pinions, flutes in end mills, taps, counterbores and cutting gear and sprocket teeth. Squares on tap shanks, tangs, flats on locators, multiple slots and notches of all kinds are easily milled. Larger work can be held on an arbor in one of the collets for milling and drilling.

Punches can be ground round, square, hexagon, or to other

usual shapes. Special size square, hexagon, octagon or other shape test plugs can be machined and ground to size.

The Hardinge Collet Index Fixture is very handy for making one or two lipped cutters for high speed milling heads, grinding to shape from hardened high speed steel. It is ideal for sharpening woodruff and other shank cutters—also, for sharpening the end of teeth on reamers, end mills, hollow mills, counterbores and for grinding broaches, etc.

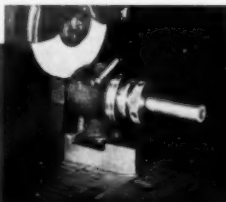
PRICE: \$45.00 ASK FOR BULLETIN CF GIVING COMPLETE DETAILS

HARDINGE BROTHERS, Inc.,

ELMIRA, N. Y.



MILLING APPLICATION



GRINDER APPLICATION



WITH TAILSTOCK AND SUB-BASE

ARMSTRONG

DROP FORGED "C" CLAMPS



Because they never give, these ARMSTRONG Heavy Duty "C" Clamps are safely used, day after day, to carry these gigantic steel automobile body dies where the slightest spread or spring or the least slippage of the screw would result in disaster.

Here is dependable quality that you too can rely on. Look for the Arm- and -Hammer Trade Mark. It guarantees a better clamp.



HEAVY DUTY "C" CLAMPS

Drop Forged from special steel, heat treated to give extra strength and stiffness. These stronger clamps have long hubs and alloy steel screws. Capacities from $\frac{3}{4}$ " to 12 $\frac{1}{2}$ ".

MEDIUM SERVICE "C" CLAMPS

A strong clamp adapted to general use that gives maximum holding power consistent with convenient weight. Drop Forged, heat treated body. Special steel screw with free acting swivel. Capacities from 2" to 18".

LIGHT SERVICE "C" CLAMPS

A light, strong clamp, fast operating. Ideal for general shop use, for assembling, holding airplanes, automobiles, boats, etc. Forged, heat treated body, special steel screw. Capacities 2" to 12".

DEEP THROAT "C" CLAMP

This clamp is designed with an extra deep throat to give maximum clearance required by body builders, woodworkers, welders, etc. Capacities 2" to 12".

TOOL MAKERS CLAMPS

Drop Forged and heat treated to increase toughness. Screws are also drop forged, have square neck to take wrench and come plain or with swivel end.

ARMSTRONG BROS. TOOL CO.

"THE TOOL HOLDER PEOPLE"

308 N. FRANCISCO AVE.,

CHICAGO, U. S. A.

Eastern Warehouse and Sales: 199 Lafayette St., New York



Write
for
Catalog
C-39

ARMSTRONG TOOL HOLDERS Are Used in Over 90% of the Machine Shops and Tool Rooms

HITCHCOCK'S MACHINE TOOL BLUE BOOK

28,700 THIS ISSUE

MAY 1940

VOLUME 35, No. 5



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Bld., Lakewood.

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COLLETS
ANY TYPE... ANY SIZE... ANY QUANTITY
Delivered To You WITHOUT DELAY or ERROR



THERE's never a hitch in the delivery of Modern Collets. You need submit no details other than those concerning the machines on which they are to be used. The chances are that they can be supplied immediately from the thousands of screw machine, lathe or milling machine collets which are always carried in stock. If it is a type not generally used, our complete information file covering approximately 7500 different collets will give us every specification we need . . . and you can expect prompt delivery of the exact collets you require.

**FIVE TO SEVEN
 MINUTES FOR A
 COMPLETE COLLET
 SIZE CHANGE-OVER
 with MARTIN
 MASTER COLLETS**

Of even more importance to you, you will be furnished with collets designed to do a better job on your machines. Modern Collet's now-famous Martin Master Collet, for instance, reduces change-over time to an absolute minimum and has proved thoroughly trouble-free in its patented construction. Exclusive features of design and construction are found in every type of Modern Collet—and in every other Modern replacement part or tool. They're features that assure you of dependable, trouble-free service—always!

WRITE FOR OUR NEW COMPLETE CATALOG.

MODERN COLLET and MACHINE CO.

403 Salliotte Street

Ecorse, Michigan



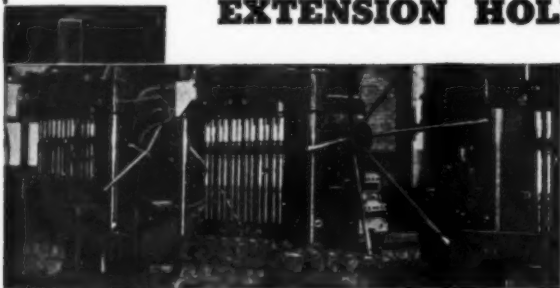
Hydraulic CYLINDERS

Hanna Cylinder

Ten different models to meet just about every type of mounting requirement. 1-1/2" to 8" bore with the length of stroke whatever is needed. A complete line of standard cylinder units from which to choose.

HANNA
Engineering Works
1765 ELSTON AVE., CHICAGO, ILLINOIS

***Compensate* for TOOL WEAR
and UNEQUAL TOOL LENGTHS
on single and multiple spindle jobs
with MIDWEST ADJUSTABLE
EXTENSION HOLDERS**



SIMPLE in design and **RUGGED** in construction
**MIDWEST Adjustable Holders give micrometer
longitudinal adjustment in steps of .001"**

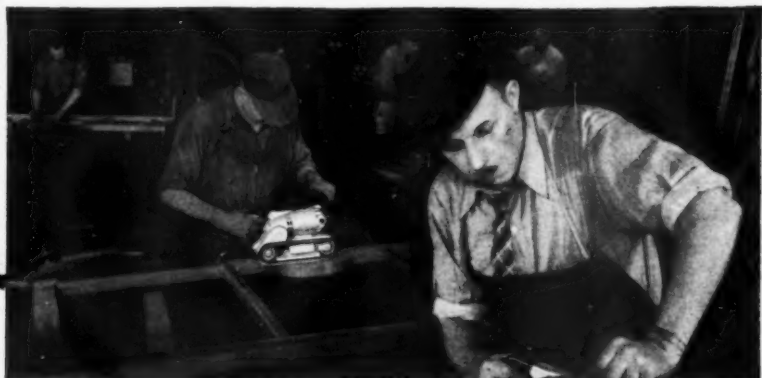
HERE'S HOW THEY WORK

MIDWEST Adjustable Extension Holders give extremely accurate alignment in all positions by a straight ground fit between the sleeve and the shank. A key anchored in the sleeve and having a slidable fit in a keyway in the shank provides a positive drive.

MIDWEST holders are constructed to give a longitudinal adjustment of .001 of an inch by the movement of the knurled collar one space on the scale at the lower end of the collar. This tool is so constructed that the collar is held firm and will not turn unless moved with a simple twist of the operator's hand; **NO TOOLS ARE REQUIRED AND THERE ARE NO SCREWS OR LOCKNUTS TO GIVE TROUBLE.** In other words, all adjustments of MIDWEST holders are easily and quickly "hand made".

FURTHER INFORMATION covering various styles and sizes offered will be found in **BULLETIN 16 H**—write immediately for your copy.

MIDWEST TOOL & MFG. CO.
2351 W. JEFFERSON AVE., DETROIT, MICH.



To remove scale . . . to
get a smooth finish on
bronze elevator doors

BALDWIN BRASS WORKS USE

SKILSAW Zephyrplane THE MODERN 3 IN. BELT SANDER



HERE ARE ITS OUTSTANDING FEATURES

- Patented lever makes belt-changing quick and easy.
- Knob handle can be moved from top to the nose of sander for greater convenience when sanding vertical surfaces.
- Perfectly balanced for even pressure on entire sanding surface.
- Lighter, easier to handle, weighs only 13¼ lbs.

Ordinary sanders tear metal . . . hand sanding is too slow. . . so Baldwin Brass Works of Chicago chose the SKILSAW ZEPHYRPLANE to make their finishing operations quick and profitable. Working at a special belt speed of 750 R.P.M., ZEPHYRPLANE now removes the scale and puts a satin-smooth surface on the high grade bronze elevator doors that this company make.

ZEPHYRPLANE saves time and money wherever finishing is done on metals, wood or compositions. Special belt speeds for aluminum, bronze, copper and stainless steel surfaces. Plugs into any light socket.

SKILSAW, INC., 5035 Elston Avenue, Chicago

36 East 22nd St., New York — 182 Main St., Buffalo — 52 Brookline Ave., Boston — 15 So. 21st St., Philadelphia — 2124 Main Street, Dallas — 918 Union St., New Orleans — 1253 South Flower St., Los Angeles — 2065 Webster St., Oakland — 29 North Ave., N. W. Atlanta.
Canadian Branch: 85 Deloraine Ave., Toronto

SKILSAW
SAWS • BELT SANDERS • GRINDERS • BLOWERS
DRILLS • DISC SANDERS • FLOOR SANDERS
PORTABLE ELECTRIC TOOLS

SEE YOUR
DISTRIBUTOR
— he will gladly
demonstrate
how SKILSAW
TOOLS will
save you money

Save UP TO 80% on Machining Costs!

Motor-Avey

Drilling AND Tapping Machines

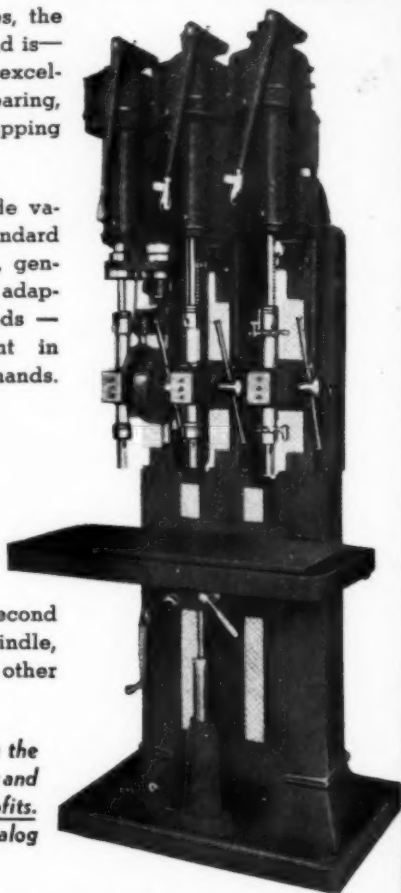
For more than three decades, the name "AVEY" has been—and is—regarded as the standard of excellence in the making of ball bearing, sensitive drilling and tapping equipment.

Avey products include a wide variety of types and sizes in standard single and multiple spindle, general purpose machines—also adaptations to specialized needs—meeting every requirement in today's high production demands.

TYPE MA-6 Six Speeds

The unit shown is the six-speed No. 2 Combination Machine Type MA-6. First spindle is Avey-matic; second spindle, hand feed; third spindle, tapping. Can be supplied in other combinations as required.

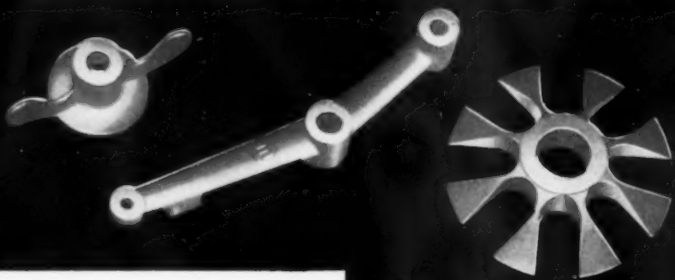
Let AVEY Equipment show you the way to new economies in drilling and tapping—new production profits. Send TODAY for AVEY Catalog No. 39.



The AVEY DRILLING MACHINE CO., Cincinnati, O.

Save UP TO 90% on Machining Costs!

By DIE CASTING Copper Base Alloys



Copper base alloys, with copper contents up to 98%, are now being successfully die cast under the Harvill Hi-Pressure system...at costs competitive with sand casting! Because of the close tolerances...because of the smooth surfaces...because of the intricacy of design possible by this method...die casting copper base alloy parts and assemblies saves as much as 90% of machining costs. The Harvill Hi-Pressure method of casting retains every favorable characteristic of the alloy used...giving tensile strengths up to 100,000 lbs. per sq. in.

Investigate the savings YOU may be able to make by using Harvill Hi-Pressure castings or by installing a Harvill Super Hi-Pressure die casting machine.

Write for data today to:



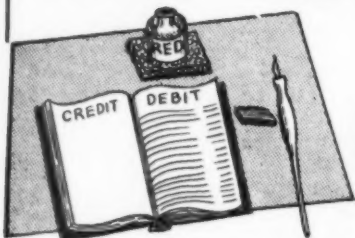
HARVILL

Aircraft Die Casting Corporation

2344 E. 38th Street

Los Angeles, California

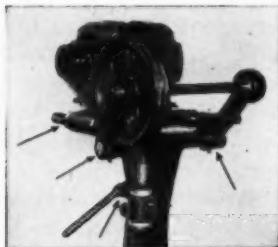
STOP using **RED INK**



Install BERKELEY DRIVES

on all your Machine Tools

*Any
Machine
Any Type
Any Size*



Individual Berkeley Motor Drives installed on your Machine Tools, will increase your production while decreasing your output costs. These drives will enable you to add another machine in your shop, by saving you money and actually giving you more floor space. The first cost is also reasonable.

These Custom-Built Drives are made for your machine tool, according to your specifications. The Arc Welded Steel Bracket Construction enables us to make many different types of drives without the necessity of molds, thereby saving you money on the purchase price.

Let us give you a quotation on your motorizing needs. Absolutely no obligation.

THE BERKELEY EQUIPMENT CO.
CORRY, PENNSYLVANIA

More Power than
you can use in
New POWERPLUS Grinders

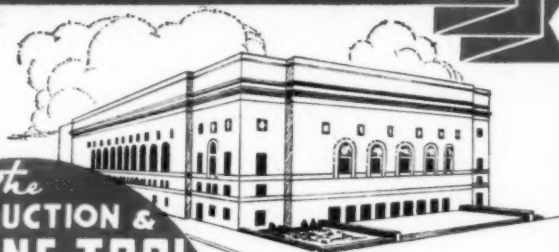


ROTOR TOOL
COMPANY

CLEVELAND, OHIO

SEND FOR YOUR COPY OF "POWERPLUS" BULLETIN NO. 19.

Here's the Announcement You're Waiting For



The
**PRODUCTION &
 MACHINE TOOL
 ..SHOW..
 CLEVELAND
 PUBLIC AUDITORIUM**

**JUNE 25TH to 29TH
 1940**

WHY

"...because it heralds THE PRODUCTION AND MACHINE TOOL SHOW to be held at Cleveland the latter part of June.

Modern developments are continuously taking place in the industry; you will see what new improvements have done to help you do your job better, faster and more economically. Here under one roof will be the gist of all that this modern streamline age has to offer.

The City of Cleveland has been chosen for its central location, as the most convenient for the greatest number. While every effort is being extended by the management to make this show of the greatest importance, the educational feature will be a revelation."

*For information wire or write
 the management of The Production and
 Machine Tool Show, Grafton, Wisconsin.*

MACHINE TOOL SHOW
THE PRODUCTION AND
CLEVELAND PUBLIC AUDITORIUM - CLEVELAND

HANNIFIN No. 10 TOOL ROOM MACHINE

PRECISION LATHE
SENSITIVE DRILL
VERTICAL MILL
HORIZONTAL MILL



The Hannifin No. 10 Tool Room Machine is a practical, precision unit designed and built for accurate, economical tool room work. In many cases it has proved itself as effective as several more costly special machines.

This compact, versatile machine provides accurate, economical work capacity that formerly required four

units. It is so readily adapted to a wide variety of operations, so easy to operate, that it can often be used in production operations on small quantities with worthwhile economy.

Write

for special bulletin with complete specifications and see for yourself how useful this unit could be in your tool room.

HANNIFIN MANUFACTURING COMPANY

621-631 South Kolmar Avenue • Chicago, Illinois

ENGINEERS


• DESIGNERS

• MANUFACTURERS

HANNIFIN *Combination* TOOL ROOM MACHINE



Eliminate Seating Troubles With PUTNAM *Oversize Counterbores*



EXTRA CLEARANCE
that permits all socket
head cap screws to
seat properly.

Socket head cap screws never fail to seat properly, regardless of irregularities in their shape or size, when Putnam Hi-Speed Continuous Pilot Counterbores are used! The diameters of both the cutter and pilot for body size holes are $1/32''$ over listed sizes—an exclusive feature that is incorporated in standard Putnam Counterbores. These oversize diameters also allow for variations in parts for doweling.

And exceptional tool economy, too, can be expected of each of these counterbores. With the pilot continuous through the entire fluted portion, it can be cut off repeatedly to the desired length as the cutter flutes are ground back. You will get at least seven times longer life than could ever be expected of the old style counterbore.

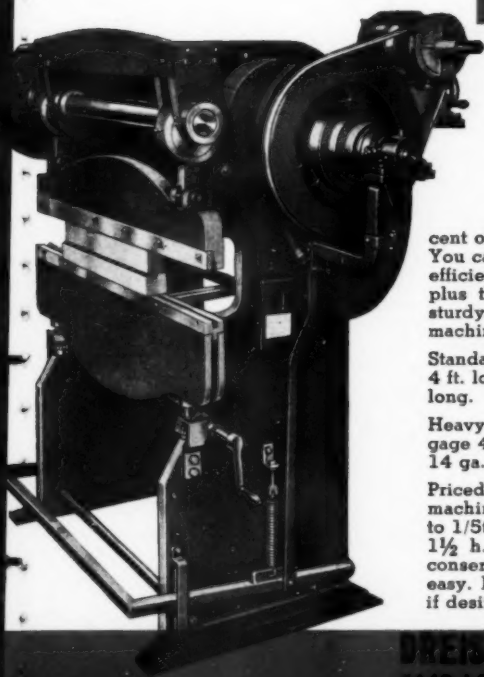
Write for full information on these trouble-saving, money-saving tools.

PUTNAM TOOL COMPANY

2983 Charlevoix Avenue • Detroit, Michigan

RUGGED

Chicago Steel Forming Press



This No. 253 is a Rugged All Steel—Powerful—Inexpensive Press Brake, designed and built to the standards of Chicago Steel Forming Presses.

A money-saving production tool that will handle 40 to to 50 percent of the work done in the average shop. You can count on greater speed — higher efficiency — much lower operating cost—plus the same high quality material and sturdy welded construction as in our larger machines.

Standard Series—3 sizes—capacities 14 ga. 4 ft. long; 16 gage 5 ft. long; 18 gage 6 ft. long.

Heavy Duty Series—3 sizes—capacities 10 gage 4 ft. long, V die; 12 gage 5 ft. long; 14 ga. 6 ft. long.

Priced at less than half the cost of other machines of similar capacity and only 1/3 to 1/5th of the weight. Powered by 3/4 to 1½ h. p. motors. Compact construction conserves floor space and makes moving easy. Furnished with variable speed drive if desired. Write for all catalogs on our presses.

DREIS & KNUMP MFG. CO.
7440 LOOMIS BLVD., CHICAGO, ILL.

KRW HYDRAULIC ARBOR PRESSES

HAVE SPEED AND POWER FOR INDUSTRIAL USE



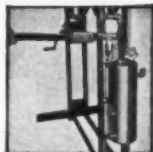
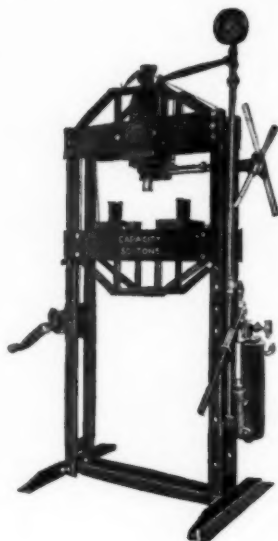
Rack teeth cut directly into ram—no separate rack bar.



Heavily constructed enclosed drum and ratchet raises and lowers bed.



Extensible cross-arms for greater leverage have locating grooves for extended and central positions.



Oil reservoir tank has convenient filling plug and shut-off valves.



V blocks furnished have machined shoulders for accurate alignment on bed.



Machined shoulders align V blocks when in inverted position and prevent slippage.

Built with the speed and strength necessary for industrial use, KRW Presses perform such operations as broaching, assembling, straightening, bending, offsetting, squeezing, pressing, and flattening. Small blanking operations can be performed when the blanking dies are built into a die set provided with guide pins.

Strictly a one-man press, special KRW features minimize operator fatigue. Trussed design of bed and crown members results in extreme rigidity and accuracy.

Write for new bulletin describing this cost-cutting equipment.

PRICES F. O. B. FACTORY, ARCADE, N. Y.

PRICES SLIGHTLY HIGHER WEST OF ROCKIES

No. 37—25 ton Hydraulic and Sensitive Arbor Press	\$180.00
No. 37E—50 ton Hydraulic and Sensitive Arbor Press	235.00
No. 37F—75 ton Hydraulic and Sensitive Arbor Press	365.00
Gauge and fittings, \$20.00 extra on all presses.	

K. R. WILSON

27 Lock Street, Buffalo,

N. Y., U.S.A.

Export Department

90 West St., New York, N. Y.

West Coast Branch

722 Mateo St., Los Angeles

THERE IS NO SUBSTITUTE



ROSS
Air Control
VALVES



FOR AIR HORSEPOWER

THESE three features are built into every Ross valve, regardless of size or type. No matter what your needs may be, in the big Ross line there is a valve to exactly fit your requirements. Our engineers will gladly help you in making proper selection.

Catalog sent on request.

ROSS Operating VALVE CO.
6480 Epworth Boulevard
DETROIT, MICHIGAN

FOR A HACK MULTI-VERSAL

THERE IS NO SUBSTITUTE

Found in the Finest

A Necessity in Every *Announcing The New*

There's no substitute for a HACK-MULTI-VERSAL because no other machine can duplicate its performance. Its all-around versatility of operation is unequalled.

This new model is equipped with high speed spindles for delicate precision work in non-ferrous or ferrous materials, such as camera, optical and airplane work, etc.

Just consider the time and labor saving advantage of having 30 different functions

combined in a single machine — 30 separate and distinct cutting operations which can be performed as efficiently with the HACK MULTI-VERSAL as with 30 different single

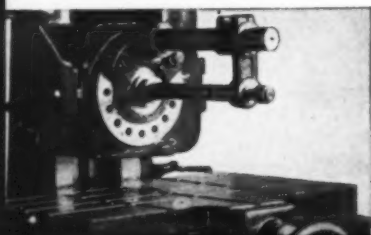
purpose machines. These functions include:

Horizontal and Vertical Jig Boring; High Speed and Roughing Vertical Milling; Horizontal Milling; Angular and Vertical Slotting; Filing; Drilling; Grinding (surface, cylindrical, internal, tool and cutter and gauge work); Broaching; Sawing; Jig Sawing; Lathe Work; Cam Cutting; Lapping; Honing; Form Tool Cutting; Keyseating; Template

Cutting; Graduating; Rack Shap-

ing; Gear Cutting; Die Sinking; Routing; Engraving; Duplicating; Contour Milling; Multiple Vertical Milling and Duplicating; and many combinations of reciprocating and rotary cutting.

Showing
Vertical Head
in Place



HACK MACHINE COMPANY

FOR A HACK MULTI-VERSAL

Laboratories & Tool Rooms

Modern Tool Room High Speed Model

The new features of these ultra-modern machines include:

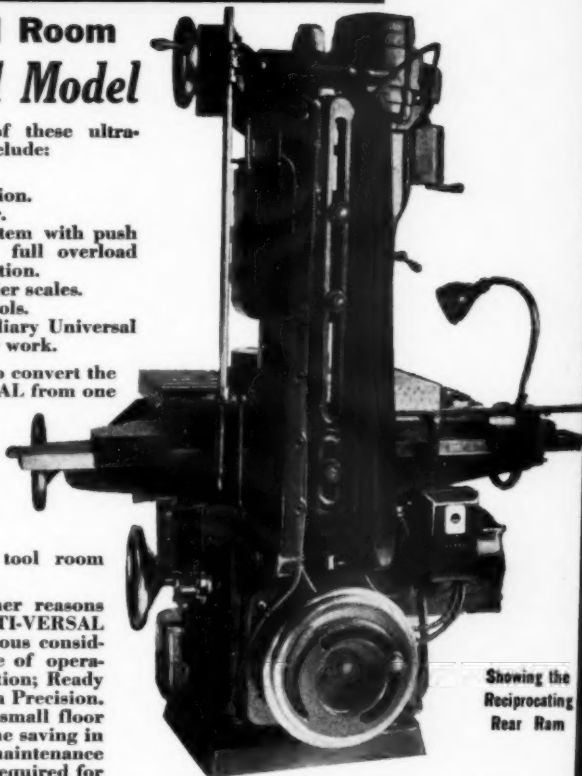
- 1—Focused Control.
- 2—Simplified Operation.
- 3—Rapid Changeover.
- 4—New Electric System with push button controls, full overload and safety protection.
- 5—Illuminated Vernier scales.
- 6—Touch Feed Controls.
- 7—High Speed Auxiliary Universal Head for angular work.

It's a simple matter to convert the HACK MULTI-VERSAL from one function to another—requiring less time than for the operator to carry his work from one machine to another. And every function is capable of producing work up to tool room precision standards.

There are many other reasons why the HACK MULTI-VERSAL merits your most serious consideration:—Convenience of operation; Safety of Operation; Ready Adaptability and Ultra Precision. Just add to these the small floor space occupied and the saving in cost, operation and maintenance over the investment required for separate machines to perform comparably, these 30 different functions.

*Write for Catalog
giving full details.*

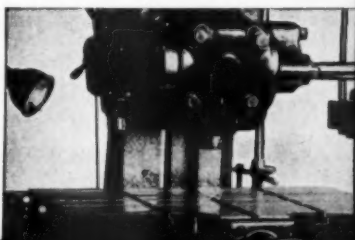
**1228 Harding Ave.
Desplaines
Illinois**



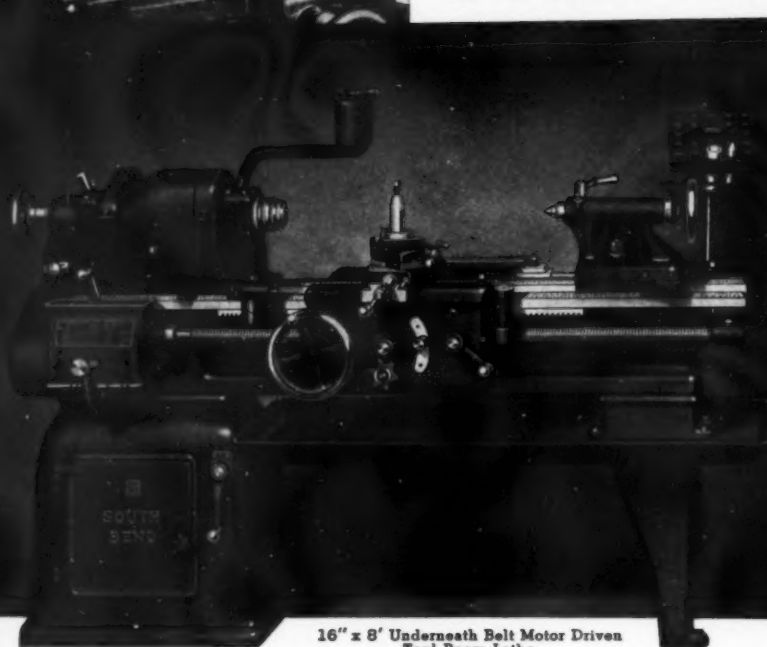
**Showing the
Reciprocating
Rear Ram**

It requires but a moment to change over from reciprocating to rotary motion. The Reciprocating Ram is shown above, with the stroke adjustment cams. Locked in position, it serves as fixed column.

The duplicating attachment is shown below.



COMPANY



16" x 8' Underneath Belt Motor Driven
Tool Room Lathe

SOUTH BEND LATHES FOR PRECISION WORK



DOUBLE WALL APRON

Back view of the Double Wall Apron showing the rigid, one-piece box type construction that provides a substantial support for both ends of the gear shafts.

Gears in the apron are of steel and have a reservoir and felt wick automatic oiling system. Worm drive assures smooth operation of feeds on all classes of work.

South Bend Lathes have been giving thousands of users dependable service on the most exacting classes of precision machine work for more than thirty years. Sound design, the most expert workmanship and the best materials available are combined in South Bend Lathes to give them permanent accuracy and efficiency.

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LATHE BUILDERS SINCE 1906

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The Editor's Page

A new operating peak of 93.4% of capacity was reported for the Machine Tool Industry for March.

This is gratifying indeed considering the ascent from 52.5% in January 1939 to 93.3% in December and there is every reason to believe that it will remain quite stable in these higher altitudes for some while to come.

In the meantime, the Industry is rushing completion of about 2000 machine tools with a total value of something like \$16,000,000. Ordered in the interim since last December, this equipment is necessary to step up production in the plants of domestic companies that are hurriedly building airplane engines.

Looking forward to the forthcoming Billion Dollar Allied plane program, engine builders and machine tool companies have already worked out tentative plans. The schedules now under consideration are based on the installation of about 4000 additional machine tools, costing roughly \$35,000,000.

When this business is placed, there will be a rush demand from engine builders. The tool manufacturers have been endeavoring to reserve provisions in their production schedules to take care of this, in spite of an unprecedented foreign and domestic demand for tools. This is revealed in the order backlogs of many of the tool manufacturers.

It is estimated that the output of machine tools during 1940 will total more than \$200,000,000. A further surmise is that the needs of the engine builders for the second airplane expansion program will run about 10 to 15% of the year's tool production.

It isn't merely a matter of the number of tool units that will be required

by the engine builders. Modern planes require the very finest of precision tools in quite a wide range of types, and with a number of special attachments and accessories.

The demands are far more arduous and exacting than for the equipment used in building automobiles and other more or less standard products. Probably less than 50 of the machine tool companies are making the highly specialized types of equipment needed by the engine builders.

It looks like a busy Summer for the tool builders.

Initiative . . .

The important prizes in money and honors are won by the fellows with initiative.

And just what is initiative?

Merely doing the right thing, at the right time, without having to be told.

Next to doing the right thing without being told, is to do it when you are told once. In other words, carrying through on orders.

There's another class in which the folks never do things until after they are told twice or more. Such fellows, of which there are many, get no honors and small pay.

Then there are the ones who do the right thing only when necessity kicks them from behind. These get indifference instead of honors and a pittance for pay. You'll find these fellows are generally ready with alibis and hard-luck stories.

Still lower down in the scale you'll find fellows who will not do the right thing, even when somebody goes along to show them how and remains to watch them do it.

Thus does Elbert Hubbard tell why some earn promotion.

**5**

REASONS FOR USING *Ryerson Certified Steels*

1 Every pound of steel in Ryerson stock is certified, prime quality. No seconds are ever carried. Ryerson has built up complete stocks of these better steels in every classification — steels made to narrow, close-range specifications that assure better working qualities.

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RYERSON



Polishing Cutting Surfaces

**Buck-Saw Edges Are as Antiquated as the First Milling
Cutter Made by Vaucanson in 1782**

By H. J. CHAMBERLAND

WITH the best that money can buy in modern machine tools and metal-cutting tools, as a team to meet predetermined standards of quality and quantity, production engineers have been asking themselves this question:—"Why does a metal-cutting tool perform so efficiently for a limited period proceeding a fresh grind, then gradually lose its cutting action?" This problem had tool specialists in hot water for some time, but is now apparently solved once and for all.

The missing link to continuous performance was nothing else than the general belief that, any cutting edge is as good as it appears to the naked eye. This misconception carries us back to some 10 years ago, when considerable attention was diverted to oilstoning as a basic step to increasing tool life. While this practice steadily increased, some production men remained skeptical and others argued rightfully that while stoning substantially increased time between grinds, this increase in maintenance cost barred a reduction in actual tool costs. A substantially more rapid method of super-finishing cutting edges now supersedes stoning. However, I am proud of the fact that I was a pioneer advocate of the present procedure in its embryonic state.

We had better start, interrogatively, to consider this improved art of ob-

taining a fine edge on any metal-cutting tool.

First, what is a cutting edge as produced by the conventional method of a single grind?

Second, What is a cutting edge as produced by a secondary light grind which imparts a so-called polish to the surface being so finished?

In both cases the edge is a line which forms the junction of two planes, but what a difference when observed through a microscope. With the former or customary ground edge, we see a broken line resembling a worn hack saw blade, were the teeth cut peak-like. On the contrary, the finely finished edge shows an unbroken line as



Oilstoning the faces of formed cutter teeth requires considerable time. That is why this extra operation sometimes shows little in the way of direct cash returns. However, surfaces thus finished usually do show some remarkable effects in the way of uniform and sustained cutting action.

Each time the side teeth of these half-side mills have to be resharpened, the required distance be-



perfect as mechanical means can produce, with no technical or scientific intent.

Now let us bear in mind that heat generated at the cutting edges of a tool, while in actual operation, is as injurious as heat generated from a sharpening operation. Assuming that a milling cutter has been given the conventional grind only, this is what happens when it is put to work:—It is obvious that the invisible peaks have no means of support, and eventually break off. The load falls on the low spots we call valleys, and unevenly distributed heat starts its destructive work. Thereafter, the cutting action gradually dwindles, as friction increases. The longer the tool is pushed

In proportion to its cutting edges, a tap undoubtedly removes more stock at a time than any other metal-cutting tool. This particular tap is "overgrown," but generally speaking, taps with polished flutes keep going from four to 10 times longer and meanwhile produce more uniform threads.

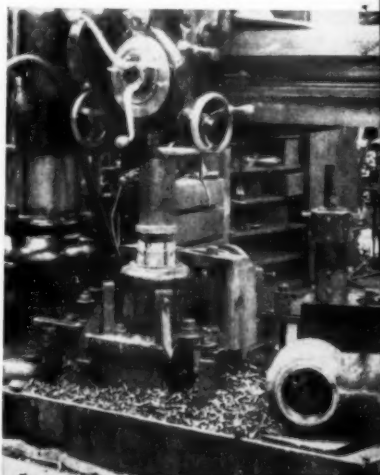
The modern polish-grind as applied to milling cutters of this type, increases the shearing action by at least 30%. Note the unbroken chips resulting from unbroken junctures to which fine particles of metal cannot adhere.

under these conditions, the greater the heat generated and the greater the damage. This is the answer to excessive and abnormal tool costs, delayed production and more or less variation in quality of work.

New Procedure Is Outlined

The improved method of super-finishing cutting edges is not in a laping, honing nor oilstoning operation. It is an attentive finish-grind produced with a specially selected wheel. The correct grade, grain bond and structure should coordinate with a lower-than-average surface speed and removal of a minute amount of stock, to produce the polished surface. The procedure applies to tools made of high-speed steels as well as Stellite tools. No mention is made of carbide-tipped tools since these are regularly taken care of with specially designed machines and diamond wheels.

The advantages of polished flutes of taps, reamers, and the like have been noted for some time. Not only the fact

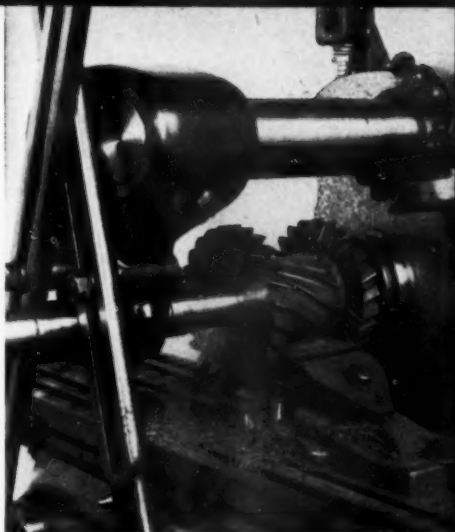


Each time the side teeth of these half-side mills have to be resharpened, the required distance between them is reduced and compensation must come from the middle cutter. Both steps are costly, but polished cutting edges in this particular case doubled the time between grinds, and therefore doubled the life of the tools.

ing machine but the tool room face grinding machine is expected to do its part in this respect. Regardless of the nature of the metal-cutting operation, it is therefore imperative that all sharpened surfaces be finely finished for best results. All types of milling cutters are unquestionably in the front line. However, this does not exclude engine and turret lathe tools as well as those serving automatics, boring mills and radial drills. Test records prove that the resulting efficiency, generally speaking and based on the use of modern equipment, is no less than a 25% increase in production, no less than 40% increase in tool life due to as much as 60% increase in time between grinds.

Primary Grind—Wheel Selection

The style of grinding wheel used in connection with this improved method of sharpening remains the same. However, composition of wheels and surface speeds vary with both operations. The wheel symbols used are Norton's, this one having been employed in this particular case. For high-speed steel tools, a 3860-J8BE has given best re-

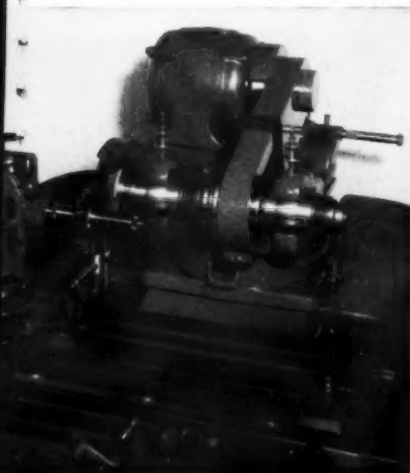


sults. This wheel is somewhat different in grade, grain and structure from that commonly used and tends to reduce heat risks at no noticeable increase in wheel cost. At any rate, it is false economy to use a harder wheel for longer wheel life. It takes but one such wheel to wing a \$25 tool and this money will buy a dozen or more of correct grade. The wheel for the primary grind on Stellite is quite similar, except for grade. Two grades softer, namely H, is recommended. Most important is the conventional surface speed of 5000-4000 s.f.p.m. This reduction also helps materially in preventing heat generation. Free-hand dressing must be avoided and for positive results, open the grain with several light-cut but quick-pass traverses of the diamond tool against the wheel face. Take a .004" to .005" cut, then approximately a .001" cut from each surface.

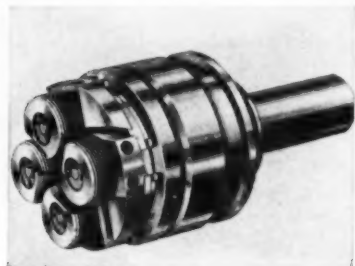
Finish or Polish Grind

This finishing operation presents no problem, providing suggestions relative

Here is a most productive type of the familiar side mill. But "Go" or "No Go" depends to a great extent upon how intelligently it is serviced. Fine edges on both peripheral and side teeth will easily double the life of this tool.



to the primary grind have been followed carefully. It is not now a question of stock - removal. Still, unintentional hills have been produced and they must be taken down to the valleys. The finishing wheel is quite different than the one previously used, since in reality it must perform a polishing act. A 37220-J8L wheel has given excellent results, and the grain (220) may vary to 330. The finishing wheel for Stellite is also of H grade, as previously recommended. In this case, the wheel speed should be lowered to 2200-2700"



Buck-saw cutting edges have no place in this threading unit shown above, even though a very curious conflict in the half tone screens suggests serrated cutting edges. In reality, the thread forms of these circular chasers have a lapped finish and only polished faces will do them justice.

s.f.p.m to provide the required polishing action. The wheel face should be carefully dressed by slow traverse, and kept wet with an occasional squirt of water from an oil can. No more than .001" stock should be removed with each pass and for this reason existing clearance angles must be precisely duplicated.

In conclusion, it seems imperative to consider briefly, the importance of having a wheel-spindle combination which is up to par. Modern grinders cause no trouble in this respect but antiquated spindles require doctoring before attempting the work. Tool grinding wheels perform at their best only when kept on individual mounts. This practice not only increases the life of any wheel but tends to keep it in perfect balance.

The method of sharpening peripheral teeth shown above, is not recommended in connection with the improvement suggestions given herein, due to the resulting concave surfaces. As slight as this concave may appear, even when magnified, it is there nevertheless and has a tendency to weaken the vital lines of the mills.

The method of sharpening peripheral teeth shown below has a remarkable effect on final results since the edges have full support. By the way, it takes only from five to seven minutes to change to the finishing wheel and execute the polish-grind on a cutter of this size.





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✓ Through a magnifying glass, note the uniformity of every cut, the sharpness of every tooth in a Nicholson or Black Diamond File. Note the evenness with which the file blank has been prepared. Tap the file for the ring that spells soundness and proper hardening.

✓ Then put it to the test of performance. Check it for keenness and smoothness of bite throughout its length (no "skips," "hills" or "valleys"), for the way it holds to the line of work, for the number of sharp-cutting file strokes it can deliver under proper handling.

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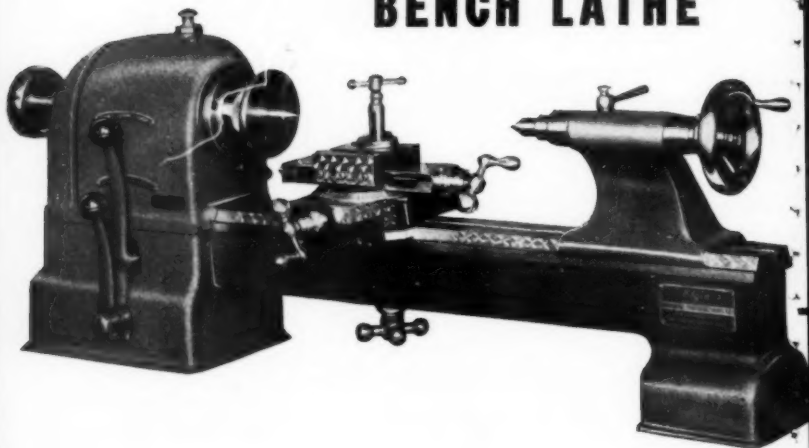
FOR EVERY PURPOSE





ANNOUNCING

ENCLOSED HEAD PRELOADED BALL BEARING SPINDLE BENCH LATHE

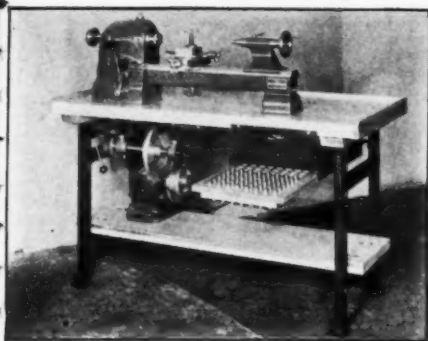


At long last, here is an Enclosed Head Lathe on which you can replace the belts in five minutes. No special tools required—no experienced mechanic needed—it is not necessary to remove the whole spindle, bearings, and plates or head. You can replace the belt by unscrewing two bolts, and removing the cover.—Simple, isn't it?

With this lathe, you get extreme accuracy and precision at high spindle speeds. The Tailstock has a large dial on the hand wheel graduated to thousandths of an inch. Two half nuts positively lock the spindle without any misalignment. The Super Precision Duplex Preloaded Ball Bearings in the front and Duplex bearings in the rear assure absolutely no end or radial play. The spindle is

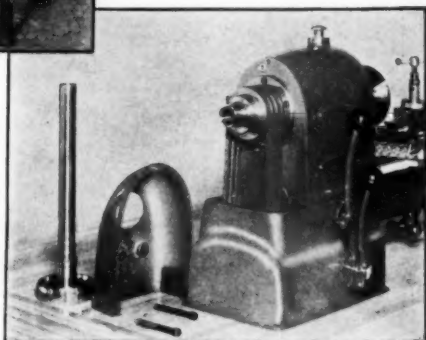
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complete set of
collets**

**Simplicity of
design enables
anyone to change
belts quickly
—by removing
two bolts**

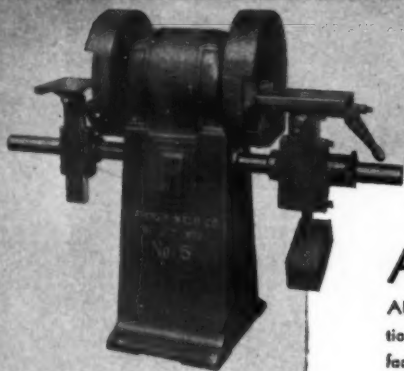


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Taper Pin Applications

Methods of Using These Handy Little Gadgets
and Making Them "Stay Put"

By H. F. WILLIAMS

SOME years ago it was the foreman's delight, much to our disgust, to alter the appearance of our taper pin assemblies. These were fitted as at A in Fig. 1, the rounded head and end protruding as shown. Invariably the large end was pounded in $\frac{1}{16}$ " farther, thereby making an unfilled hole on one side and a protruding portion at the other end. We had fitted the pins too loosely, by tapping the head too lightly, resulting in a loose fit. This, of course, was partly due to incorrect reaming and partly to design.

Standard taper pins are so made, that the effective length comes in intervals of $\frac{1}{4}$ " and the tendency is for the designer to make his hubs and bosses of diameters equal to the effective lengths of the pins.

For better work, the pin should be chosen $\frac{1}{8}$ " to $\frac{1}{4}$ " longer than the hub diameter, as shown at B in Fig. 1. If but a small protrusion is required at either side, the hub dimension should be approximately $\frac{1}{8}$ " less in diameter. Standard taper pins should be used in place of straight pins wherever possible.

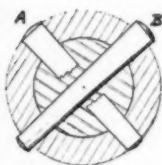


Fig. 1.

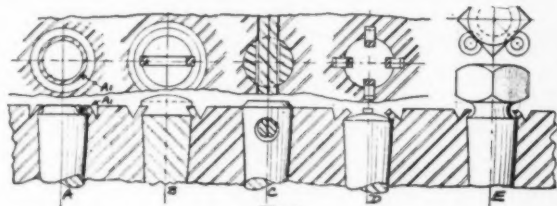


Fig. 2.

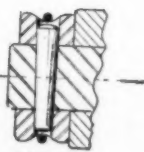


Fig. 4

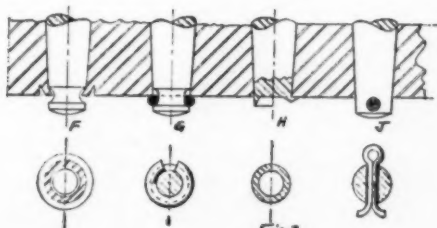
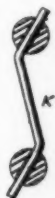


Fig. 3.



Their greatest asset is that once removed from the hole, they can always be driven in again with a resultant good fit, which is impossible with straight pins in similar assemblies. These pins can be bought either heat-treated or not heat treated. The latter are usually made of a mild steel of not more than 0.20 carbon and are usually finished unground.

For heat treated pins, SAE 3140 or 3140X is used. This is a nickel chromium steel of 0.35 to 0.45 carbon, the latter having a slightly higher chromium content than 3140. This steel is given a toughening heat-treatment at about 1500° F. and quenched in oil, giving a Rockwell "C" hardness of from 44 to 46. Pins made of SAE 3140X are first normalized, then hardened the same as SAE 3140.

Sometimes a low carbon straight nickel steel is used and case carbonized, especially when a real soft core is desired. Usually this material will withstand twisting strains better at the corners of surfaces used for wrench contact.

Positive retention of taper pins often presents a problem, especially if used in remote locations, such as internally, sub-assembled mechanisms, gear boxes, hydraulic units, beds and like units, where the loosening and disengagement of a taper pin would cause damage. This may be accomplished by special treatment to either end of the pin. In Fig. 2, a round staking tool, such as used with small presses, peens over a small ring of metal as at A, purposely shown enlarged. The thickness of this ring might range as small as 0.006" to 0.010", so that if the pin must be removed, the ring will readily straighten when pressure is applied to the small end.

At B, the large end is slotted and a narrow staking tool or sharp hand chisel, upsets enough metal to enter each side of the slotted pin head. At C, a hole is drilled which accommodates a common cotter pin. In the arrangement at D, a standard pin is used, the staking tool peening over metal in four places only. At E, a special pin is made from square stock, the width across flats being the same

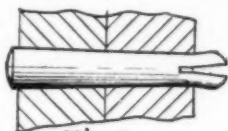


Fig. 5

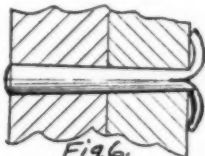


Fig. 6

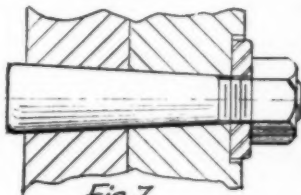


Fig. 7

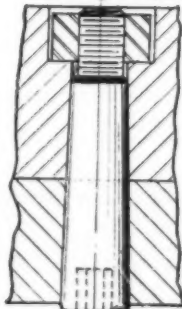
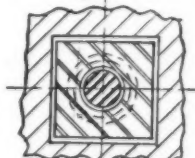


Fig. 8



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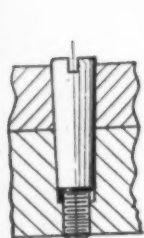


Fig. 9

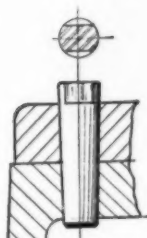


Fig. 10.

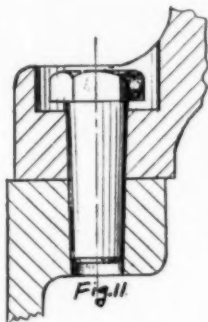


Fig. 11

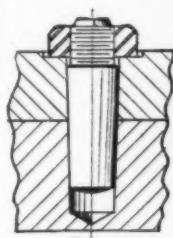


Fig. 12.

as the large diameter of the taper. It is necked directly below the head, and into this groove, using a common center punch, either two or four burrs are raised. With the exception of method C, these uses are mostly applicable only to steel, although semi-steel or cast iron containing approximately 40 percent of steel, has been successfully staked or peened.

Sometimes it is desirable, because of the appearance factor, to retain the pin at the small end, rather than at the large end. This is because the upper end may be hidden or less conspicuous. At F, Fig. 3, a half-round groove is turned and a ring of metal staked into it. At G, a shallow but elongated groove takes a small ring of spring steel wire. The end of the pin at H is countersunk to a thin edge as shown to the left of the center-line. It is afterwards rolled or flattened over with a ball-peen hammer. At J a small cotter pin of only $\frac{1}{16}$ in diameter is used while at K, if the pins are close enough, a piece of spring wire may be bent and assembled with slight tension at the ends to retain it as assembled. Another variation of this method is to use soft wire and twist the ends as is done on hexagon head screws, drilled for wire locking purposes. In many of the applications of Figs. 2 and 3, it is not intended to anchor the pin solidly with the retention means but to prevent the pin from falling out, if it becomes loosened, acting merely as a safety feature.

In Fig. 4, is illustrated the use of a common taper pin which is shorter than the outside diameter of the collar. A shallow groove with well rounded corners, is turned in the periphery of the collar and accommodates a ring of spring steel wire which is snapped into the groove. When production warrents, these rings can be snapped or ground off a spring of proper diameter. The space between the ends should, of course, be less than the large diameter of the pin when the ring is in place. The flattened corners of the groove allow easy access of a wedged tool for removal of the retaining ring.

The lower end of the pin in Fig. 5 is slotted for a distance slightly greater than the large diameter, and before heat treating, is spread slightly, not more than 0.010". As the pin is inserted into the hole, it springs together and when in place, it expands enough to keep it from being jarred out.

In Fig. 6, the lower end is slit and the ends are spread at assembly as a cotter pin. This pin is made of very soft steel, having less than a 0.20 carbon content. Enough manganese, approximately 0.40 to 0.80 per cent, is included for toughening, to allow a comparatively large section of metal to be bent over at a 90° angle. This type of pin is commonly used in Europe.

The lower end of the pin in Fig. 7 is threaded for a hexagon nut and washer. The nut has a National fine thread for a better locking helix angle of the thread. This is a common method

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MODERN TOOL WORKS

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of fastening together long sections of beds cast in several pieces in conjunction with clamp bolts. Usually a different taper is used than for a standard taper pin. A number 5 or 6 Morse taper is satisfactory, resulting in pins $1\frac{3}{4}$ " and $2\frac{1}{2}$ " diameter respectively, having a length of 6" to $7\frac{1}{2}$ ". The threaded end is made as large as the small end of the pin permits. The pin is hardened and ground as the fit required is very accurate. As an added precaution, a castellated nut and cotter pin can be used. The washer and counterbore surface should be smooth and perpendicular to the axis of the hole. The washer is usually surface ground on both sides.

When appearance is a factor, the application in Fig. 8 is effective. One member to be pinned, has a cored square or hexagonally shaped depression into which fits the nut, tightening the pin and keeping it from turning. The upper end is drilled and broached for a hexagon shaped wrench as is used for hollow head screws. This method does not permit drawing together as tightly as that in Fig. 7 and the nut does not have so accurate a seat, but because it is large, it can be successfully used on a rougher class of work.

In Fig. 9, the threaded end screws directly into the metal of one of the held members. If this is in cast iron, sufficient thread contact should be allowed so that the threads will not be stripped. The upper end is slotted, or when the pin is large enough, it can be broached for a hexagonal wrench.

For easy withdrawal of taper pins, several methods are available for use, especially where the pin cannot be driven out. In Fig. 10, the head of a standard pin is straddle-milled and the milled portion cyanided or case carburized. In this method, the pin

head must protrude for wrench accommodation, but in Fig. 11, a special pin is shown with hexagon head. The head is sunk into a counterbored hole. This hole is made large enough to allow entrance of a standard socket wrench. In this instance, the pin was made of SAE 3140X, heat treated and ground steel.

The method illustrated in Fig. 12 was designed to provide for easy withdrawal. The large end of a standard unheat-treated pin is turned down to prevent deforming the threads of National fine pitch. Used on an outside flange, the nut is screwed on loosely to protect the threads. One disadvantage of this method, when used with hexagon head screws is that, in the field, when the screws are tightened periodically, there is danger of tightening the pin nut which would withdraw or at least loosen the pin. But when hollow fillister head cap screws are used, this danger is overcome to a great extent.

As shown in Fig. 13, the upper end of the hardened special pin is threaded a larger diameter than the pin and engages threads directly in one of the held members. A square head above the thread facilitates assembly or removal. Fig. 14 has a straight bearing on either end of the taper, the latter being the means of adjustment for a cutter blade.

The lower end of the stud, bolt, screw or tie-rod in Fig. 15 is slotted 120° apart after the pin hole is reamed. The taper pin is placed loosely in the hole and upon screwing the member home, the pin contacting the bottom of the drilled hole, expands the male member to bind the screw threads. This method is only used where a permanent assembly is desired.

In Fig. 16 is shown a method of locking a ball bearing in place on its

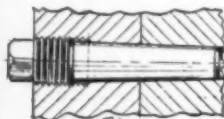


Fig. 13.

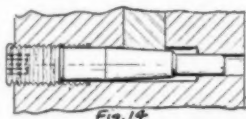


Fig. 14

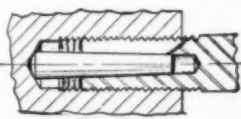


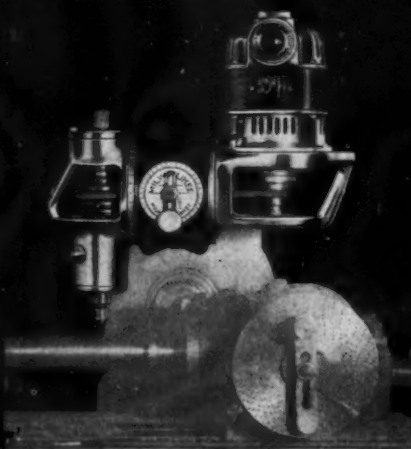
Fig. 15

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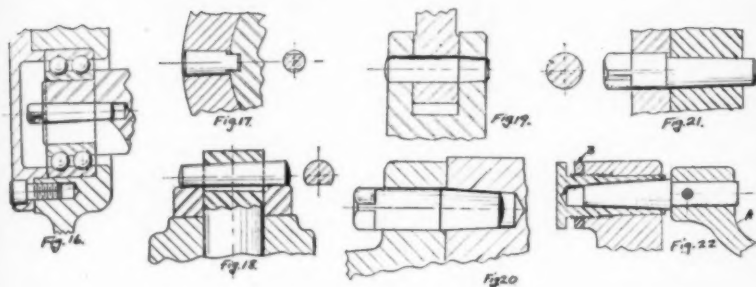
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shaft seat. In this case, the shaft was turned several thousandths smaller than intended and to save the shaft, the end was taper seamed and the pin driven in, after which the cap was screwed on. The pin head was square-milled to keep the width across flats as large as possible for pin removal and bearing replacement. This application worked out excellently, and prevented scraping an expensive spindle.

A taper pin may also be used as a key as is indicated in Fig. 17. A number 8 or 9 pin is cut off to the desired length and straddle-milled at the small end to fit the keyway in the sliding member as illustrated in the end view. Although the pin must be assembled exactly in line with the keyway, the slatted sides are of sufficient length to make an efficient guide. The pin is held in place by friction only and may be replaced readily if wear occurs.

In Fig. 18, the pin is milled flat, parallel to its axis as shown in the sectioned end view. The hole in the shaft is taper reamed in a location for either a locking or running position of the collar. Further adjustment of the collar is made by re-reaming the hole so that the pin may be driven in farther, thereby moving the flat milled surface axially toward the collar bearing surface.

The pin in Fig. 19 is tapered only at one end and driven into the stationary member of the mechanism. The upper end has a metal-to-metal contact

and the center member pivots about the pin. This method is used as a hinge, or for pivoting the connecting rod of a link mechanism.

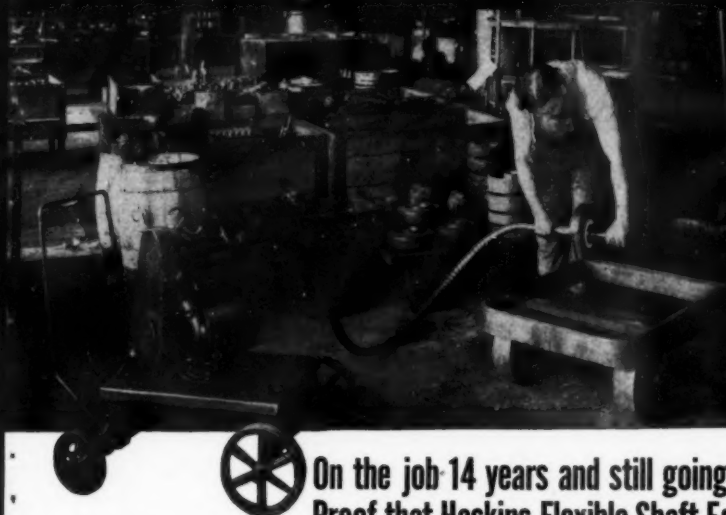
In Fig. 20, the pin is used as a dowel in a blind hole, the square head being necessary for removal. This type of pin, when heat-treated is also used as a stop to limit the travel of longitudinally moving or oscillating parts. One advantage of this construction is that when wear occurs through abrasion, the pin can be loosened and rotated a few degrees, thereby presenting a new and accurate surface for stopping against. This does not alter the stop position as when re-reaming a hole for a completely straight and larger diameter pin.

Directly above the tapered portion of the pin in Fig. 21, is turned an eccentric for adjustment laterally of the steel piece in the assembly. Not only does the square head facilitate withdrawing the pin, but it allows for fine adjustment, after which the pin is driven home.

The swinging member A in Fig. 22 has a trunnion pressed into it. The tapered end acts as a journal and enters the adjustable sleeve in the stationary part of the assembly. The sleeve, oil grooved, may be adjusted to the fit desired and locked in place by the hexagonal nut B. The taper is approximately $\frac{1}{8}$ " per foot.

Figs. 23 and 24 are hinge arrange-

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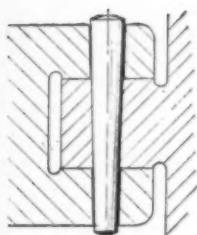


Fig. 23

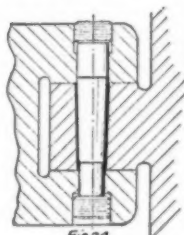


Fig. 24

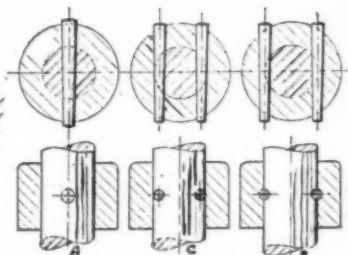


Fig. 25

ments. In Fig. 23, the pin hole is reamed in both pieces when assembling. The center member is then removed and the reamer given a few twists in the outer part to remove from 0.001" to 0.002" for clearance. When assembling, the pin is pressed tightly into the inner part. Further adjustment may be accomplished by repeating the process. The reverse can be had by making the pin fixed in the outer member and re-reaming the inner member for a running fit.

Such is the case in Fig. 24, in which the stationary part is tapped either side for short socket set screws. Oscillation is on the tapered portion of the pin while the straight ends have a close sliding fit. For adjustment, one screw is loosened a trifle and the other one tightened. No lock nuts are necessary on the screws.

A test was made some time ago to ascertain the strength and holding power of taper pins placed at various locations in an assembled shaft and cast iron lever hub as illustrated in Fig. 25. A standard number 6 unheat-treated taper pin was pressed in both pieces directly on the axis of a 1 3/16" diameter shaft as at A. Two number 4 pins were placed with axes tangential to the outside diameter of the shaft, namely 1 3/16" apart as shown at B, so that half of each pin was in the shaft and half in the cast iron lever at the shaft center line. At C, number 4 pin was so located 15/32" either side of the center line, that the full diameters of the pins were within the shaft at its axis. The number 6 pin had an area

of 0.077 square inches at the shaft axis while the number 4 pin had an area of 0.039 square inches in the same location. This made the area of two number 4 pins equivalent to that of one number 6 pin.

Under test for torsion, the lever with one number 6 pin, was firmly held and the shaft twisted until the pin sheared at a reading of 1250 lbs., load. When testing the method at B, the casting broke under a load of 1150 lbs. The assembly at C in test was loaded to 1325 lbs., when the hub of the casting broke.

Upon examination of methods B and C, it was found that only one pin carried the load in each instance. Therefore one number 4 pin positioned as at B or C is more effective than a number 6 pin (with an area twice that of a number 4 pin) when placed radially.

Brushing On Silver Plate

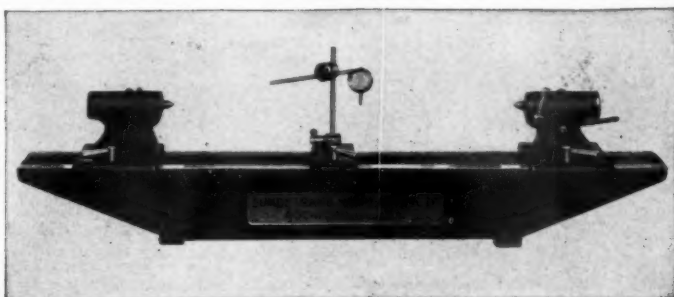
A method of applying silver plate in thicknesses of from .0002" to .001" by brushing, is offered by Rapid Electroplating Process, 1414 S. Wabash Ave., Chicago.

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Broaching Inside and Out

**Presenting Some Interesting Case Histories on
Actual Broaching Operations**

**By M. E. ENGBRETSON,
The Oilgear Co., Milwaukee**

AT the outset, broaching operations were confined largely to the machining of internal keyways, splines, etc. External operations were not so common until recently. Now, internal and external surface broaching are common practices, with many advanced tooling set-ups.

Production, accuracy and finish problems in machining a wide variety of internal and external surfaces on ordnance parts have been solved by modern fluid power variable speed broaching equipment. Round, oval and form holes, keyways and splines in carbon steel rifle parts are being finished on Oilgear vertical pulldown broaching machines. External flat, step, arc and form surfaces of rifle parts are finished on Oilgear single and double slide vertical surface broaching machines. A series of 26 machines were recently manufactured and equipped with high speed tools and fixtures for broaching ordnance parts.

All internal operations were performed on vertical pulldown broaching machines. These machines featured automatic tool handling, dual pushbutton control with selector switch for manual, semi-cycle, or semi-automatic operations; automatic puller operation; positive lubrication of work and tools; variable broaching and return speed and a minimum amount of floor space. No clamping, threading of work over tool shank, handling of tool puller keys

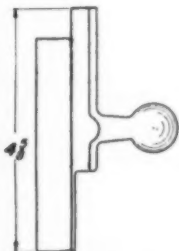
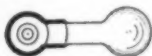
or complex fixtures are necessary. Parts are merely laid on the simple fixture and roughly located. The tool centralizes the part before broaching.

All external operations were performed on single and double slide vertical surface broaching machines. These machines featured dual safety pushbutton control with selector switch for manual, semi-automatic, or full-automatic operations; automatic, straight in and out shuttle table operation positively interlocked with tool slide operation; micrometer type positive stops, for precise positioning of shuttle table work in broaching position; automatic clamping and unclamping of work; positive lubrication of work and tools; variable broaching and return speeds and a minimum of floor space.

Simplified single and multiple fixtures with automatic locating, clamping and unclamping mechanisms operated by the straight in and out shuttle table motions greatly reduced the cycle time and operator fatigue. Shuttle table brings work close to operator for convenience in loading and unloading. Multiple tools are used to finish parallel and right angle step surfaces on one or more parts with a single stroke of the tool slide. Exclusive, interlocked shuttle mechanism positively locked in the broaching position protects the tools and fixtures and the machine against damage. The cushioned accelerated and decelerated har-

monic clamping action of the shuttle mechanism permits high shuttle table speed without shock or vibration.

Broaching was the logical solution for finishing both individual and multiple surfaces, as well as for performing sequent operations. A brief study of the following operations will amplify the adaptability of broaching to solve a wide variety of machining problems:



RIFLE BOLT

MATERIAL:—Forged carbon steel.

OPERATION:—Finish broach the arc and two straight surfaces on three rifle bolts per stroke.

STOCK REMOVED:—.040" from each surface.

PRODUCTION:—495 pieces per hour.

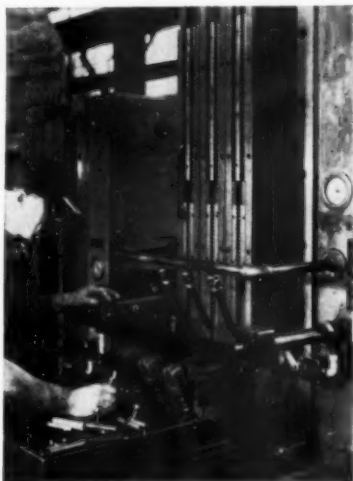
TOOL:—Special shear and straight slab form cutter bars with the lower sections arranged to broach the arc surface and the straight surfaces, while the upper tools are arranged to broach the arc surfaces. Tools for each part are assembled in an individual tool holder.

FIXTURE:—Automatic jaw type with spring loaded lever mechanism for clamping and unclamping three parts as shuttle table moves to and from the broaching position.

MACHINE:—XS-20x54" stroke single side vertical surface broaching machine.

CYCLE:—Operator places three rough parts over suitable locating pins and depresses the dual safety control buttons. Shuttle table moves into broach-

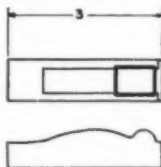
ing position and the jaws automatically clamp the parts in place. The tool slide automatically moves down to



broach the parts and stops momentarily as the shuttle table moves out to the unloading position, automatically unclamping the parts. Tool slide rises to starting position and stops. The cycle is semi-automatic.

Cutting speed 30'/min.

Return speed 80'/min.



RIFLE SIGHT BASE

(Third
Operation)

MATERIAL:—Forged carbon steel.

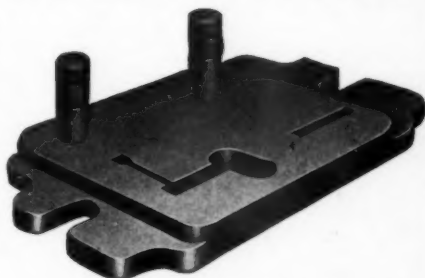
OPERATION:—Finish broach a .513" x .787" rectangular hole from a .490" diameter hole in four rifle sight bases per stroke.

PRODUCTION:—600 pieces per hour.

TOOLS:—Special one piece type with provisions for holding parts in a definite position and preventing drifting.

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FIXTURE:—Simple face plate type with locked locating screws for roughly locating parts in place.



MACHINE: — XP - 20x42" vertical pull-down broaching machine.

CYCLE:—Operator roughly locates the four parts in the fixture and depresses the dual safety pushbuttons. All four tools thread through the work in unison, enter the pullers and are automatically pulled down to broach parts. The dual pushbuttons are depressed and the vertical tool slide and the four tools are returned to the broaching position. Operator does not have to handle the tools. Cutting speed 30' per minute. Return speed 80' per minute.

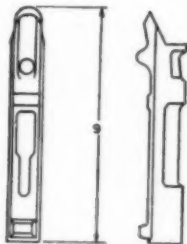
RIFLE RECEIVER

(1st Operation—Requiring 3 Draws)

MATERIAL:—Forged carbon steel.

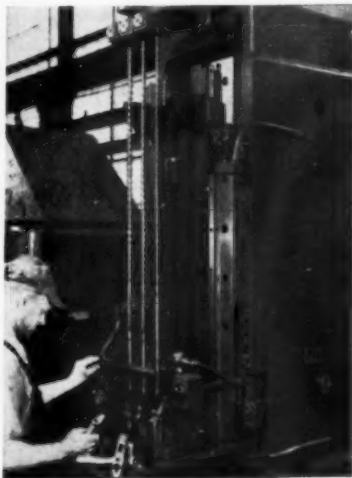
OPERATION: — Finish broach two opposing slots 15/32" wide x .162" deep in the full length of the rifle receiver. The three draws were required to re-

move the metal so as to cut down the wall force and prevent the wall from breaking out on one side where it was considerably thinner than on the opposite side. The parts are moved in



the fixture from the right to the left so that a finished part is available after each stroke of the machine.

STOCK REMOVED: — .162" deep x 15/32" wide.



PRODUCTION:—150 parts per hour.
TOOL:—Special cutter bar type with double tongues to broach the opposing

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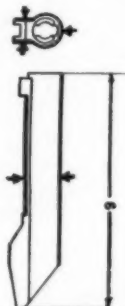
slots and arranged on both ends for automatic handling of tool.

FIXTURE:—Simple shuttle type for roughly locating the parts in position for the broaching operation, and equipped with lever to contact switch for semi-automatic operation of machine.

MACHINE:—XP-20x54" stroke vertical pull-down broaching machine, arranged for semi-automatic operation.

CYCLE:—Operator roughly locates the three parts in the fixture and slides the fixture inward to the broaching position where a small arm contacts a fixture switch and starts the broaching cycle. Tools thread through the work, enter the pullers, and are automatically pulled down to broach the parts. At the end of the downward stroke the cams on the tool slide automatically move the shuttle fixture outward to the unloading position where the finished part is removed and the other two parts are moved to the left and a new rough part is put in position as the vertical tool slide and the three broaching tools are returned to the broaching position. Operator does not have to handle the tools or depress the pushbuttons to start the machine. Cutting speed 30'/min. Return speed 80'/min.

**RIFLE
RECEIVER**
(2nd and 3rd)
Operations)



MATERIAL:—Forged carbon steel.

1ST OPERATION:—Finish broach a surface $\frac{3}{4}$ " wide x $4\frac{3}{4}$ " long and a right angle surface $7/16$ " high x $\frac{3}{4}$ " deep with the short tool on R. H. side of slide.

STOCK REMOVED:— $.045$ " maximum.

2ND OPERATION:—Finish broach a $5/18$ " radius arc and both sides of the $\frac{3}{4}$ " tongue with the long tool on the L. H. side of slide. (Each slide is equipped with dual tools and fixtures.)

STOCK REMOVED:— $.040$ " on each surface.

PRODUCTION:—180 pieces per hour.



TOOLS:—A one piece shear type tool is used for the first operation. Dual opposed shear type tool inserts mounted at the bottom of the long tool holder broach both sides of the tongue while 42 individual tooth sections with suitable spacer broach the arc.

FIXTURES:—First operation—Manual weighted lever type locator and automatic spring loaded wedge type jaw clamp. An arbor insert prevents collapse of part. Second operation—Automatic jaw type spring loaded mechanism for clamping part and arbor insert. The arbor insert prevents collapse.

MACHINE:—XD-30 x 66" stroke double slide vertical surface broaching machine.

CYCLE:—A part with the round hole and two opposing slots previously broached on a type XP-20x54" ver-

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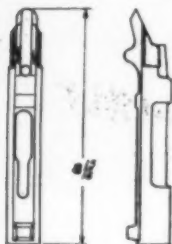
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tical pull-down machine is threaded over a form arbor and placed in the R. H. fixture and located in place with the weighted lever. Another part previously broached in the R. H. fixture is placed with the arbor in a vertical position in the L. H. fixture. The dual safety pushbuttons are depressed and the R. H. shuttle table moves into the broaching position, clamping the parts in place as the L. H. shuttle table moves out and unclamps the finished parts. The R. H. tool slide is pulled down to broach the parts while the L. H. tool slide rises to starting position. Finished parts are unloaded and rough parts loaded as the idle tool slide rises. Duplicate sets of tools and fixtures are plicate sets of tools and fixtures are used on each tool slide and shuttle table. Broaching speed 30' per minute.



RIFLE RECEIVER

(Fourth
Operation)

MATERIAL:—Forged carbon steel.

OPERATION:—Finish broach both sides of 3 rifle receivers per stroke.

STOCK REMOVED:—120" Stock on each side.

PRODUCTION:—600 finished pieces per hour.

TOOLS:—Angular slab type with individual cutters for each surface broached.

FIXTURE:—Simple face plate type with pins for locating the threaded end of each receiver and spring loaded shaped face plates to receive the parts. No clamping is necessary on these parts.

MACHINE:—Type XS-12x30" stroke single slide vertical surface broaching machine.

CYCLE: — Operator locates three

rough parts in the fixture and depresses the dual safety control buttons. Shuttle table moves into the broaching position, the tool slide is pulled down—



ward broaching the parts, the shuttle table moves outward to the unloading position and as the tool slide rises to the starting position and stops the operator removes the finished part and installs three rough parts.

The cycle is semi-automatic.

Broaching speed 30' per min.

Return speed 80' per min.

RIFLE RECEIVERS (Fifth Operation)

MATERIAL:—Forged Carbon Steel.

OPERATION: — Finish broach key slots .225" wide x .280" deep in four rifle receivers per stroke.

It is not necessary for the 2nd and 3rd operations on these parts to be performed in sequence. That is, the third operation can be performed before the second operation.

STOCK REMOVED:—280".

TOOLS:—Special cutter bar type with both ends arranged for automatic tool handling.

FIXTURE:—Simple stationary type



A Keller $\frac{1}{8}$ " High Speed Steel, Medium, File Cut Bur is shown cleaning up the oil holes of an aircraft piston. Notice how easy the Keller Bur reaches a difficult corner.

THE CRIME of the STOLEN HOURS solved by **KELLERFLEX**

STOLEN HOURS are expensive—hours that could have been spent on other work. Hand filing these pistons would have taken longer—much longer. Kellerflex was not only quicker—it was more accurate and produced a far smoother finish.

There are thousands of other operations . . . sanding—polishing—burring—blending—grooving and grinding . . . where Kellerflex Flexible Shaft Equipment can eliminate long, tedious hand filing and save

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Kellerflex machines, attachments and accessories are precision-made throughout by skilled New England craftsmen. Only the best materials go into their manufacture. They are made in so many styles and sizes you are bound to find just the machine for your requirements.

Write at once for our catalog and see why Pratt & Whitney is known the world over as—*Headquarters for the Finest of Flexible Shaft Equipment.*

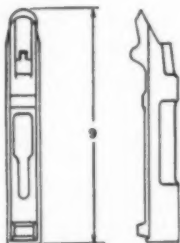
PRATT & WHITNEY

DIVISION NILES-BEMENT-POND CO.

• WEST HARTFORD, CONN.

Kellerflex Sales Department

with forms to receive parts and roughly locate them in place for broaching operation.



PRODUCTION:—750 finished pieces per hour.

MACHINE:—Type XP-12x30" stroke vertical pulldown broaching machine arranged for semi-cycle operation.

CYCLE:—Operator roughly locates the four parts in fixture and depresses

the dual safety control buttons. Tools thread thru work, enter pullers and are automatically pulled down to broach the four parts. Finished parts are re-



moved and the dual safety control buttons depressed to return tool slide and tools to loading position. Operator does not have to handle tools.

Cutting speed 30'/min.

Return speed 80'/min.

NOTE:—Any additional information desired concerning any of these particular jobs, or other broaching operations may be obtained by addressing The Oilgear Co., 1310-A West Bruce St., Milwaukee, Wis.

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No Brushes

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These new frictions make tapping a decidedly simple and inexpensive operation. These Jarvis tappers are equipped with neutralizing device and all spindles are running on ball bearings. May we submit one of them for approval?

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Production men everywhere tell us that the wide range of Delta low-cost 14" and 17" drill presses are saving their hides by enabling them to reduce costs and speed up drilling and tapping operations without a heavy investment. Many shops use Delta drill presses in batteries of from five to twenty on straight production work, in addition to using them in the tool room and general machine shop. They can be installed in a few minutes anywhere they are needed, can be used to supplement multiple-spindle machines where additional spindles are required, can be adapted easily and cheaply for special operations, replacing expensive single-purpose machines. Their many exclusive and built-in improvements have led to their adoption by thousands of manufacturers as standard production tools. And — you can get immediate delivery on them!

Ideal for Special Set-Ups, Too!

In addition to their use as standard drill presses, the heads, columns and flanges, of these machines may be purchased as separate units so that special set-ups can be made. Their low cost makes them more economical than anything that can be made up in the toolroom or machine shop. The heads can be used in any position, vertical, horizontal or angular, because their self-sealed ball-bearing construction eliminates all lubrication problems. Photographs sent in to us, showing special set-ups with Delta drill press parts, reveal how a little ingenuity can lick a tough job at a worth-while saving in tool costs.



\$59.85
No. 1011 Bench-Type
14 in. High Speed
Delta Drill Press with
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and Production Style
Bench Base, without
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Drill Press, with No. 2
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Available in High Speed
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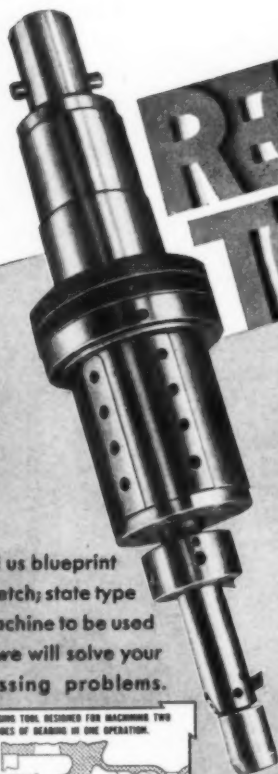
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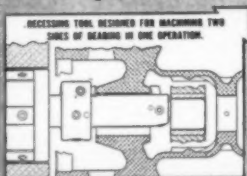
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City State Country

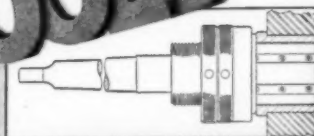
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Send us blueprint
or sketch, state type
of machine to be used
and we will solve your
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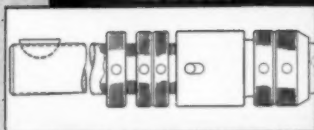


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our full line of Production Tools.



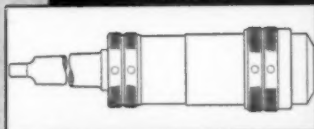
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HOLE IN PISTONS

Piece
Part



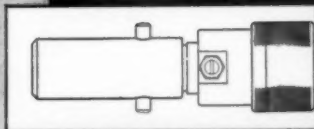
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Part



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Grinding Tungsten Carbide Tools

Helpful Hints and Suggestions by the Engineering Dept.,
Wiley's Carbide Tool Co., Detroit

THE introduction of Tungsten Carbide cutting tools has had a profound effect upon the design of machine tools, and in many cases has called for radical alterations in their general construction.

Not only is this true of the machine tools, but it applies equally to the grinding machines and wheels used for sharpening these efficient and expensive cutters. Tungsten Carbide is quite a brittle and hard material which gives exceptionally good service if properly used, but can cause endless trouble and disappointment if wrongly handled.

The grinding machine should be rigid and free from vibration, and our experience shows that holding the cutting tools by hand on a suitably designed tool rest is to be preferred to clamping them in a box type of holder. Probably the reason is due to the fact that with "hand" grinding, a more sensitive pressure is applied.

It is essential also, if cracking is to be avoided, that the grinding wheel shall run downwards towards the cutting edge, so that the grinding action is from the tip to the shank.

On no account should there be any sudden changes of temperature, as

would be the case if the tool were dipped into cold water during the grinding process. Such extreme changes of temperature inevitably produce minute surface cracks which eventually lead to the disintegration and complete failure of the carbide tip.

It is also important that correct grinding wheels should be used. They

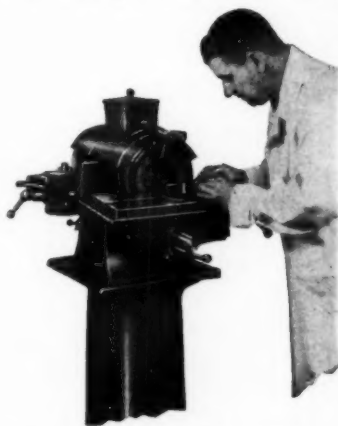
must be fast cutting and of very fine grit, and for work on insulating materials, synthetic resins and many finishing operations, a final grinding wheel, giving a burnished type of finish, is necessary.

It should be regarded as essential that the surface be finished to a high polish if the tools are to give really good service. In other words there must be no sign of a scratch on the carbide tip. In

this connection, it is interesting to note that hand lapping is not so satisfactory a method of finishing the tool as giving a final grinding by means of a free cutting wheel with a very fine grit, as for example, a diamond wheel.

So important is regrinding on the useful life of carbide tipped tools that Wiley's Carbide Tool Co., have developed two sizes of grinders, specially designed for grinding carbide tipped tools.

These grinders embody many useful



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This FREE trial offer permits any concern with a satisfactory credit rating to try out any Kipp Air Tool for ten days. Grinders sell from \$9.75 to \$58.75, Chippers and Filers at \$19.75. The BB Grinder illustrated is only \$25. Kipp Air Tools give you highest speeds, lowest prices and are proving indispensable in tool rooms and production departments. New catalog gives details.

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features, and the design is based on the maker's experience in the manufacture and operation of carbide tools. The No. K-24 is shown.

This machine has a twin grinding head with two tool rests. The tables can be adjusted for either round or rectangular right and left hand tools. They are made of semi-steel and are provided with a slot $\frac{5}{8}$ " wide to guide and support the protractor tool rest and diamond tool wheel dresser. They have an angular adjustment up to 30° from the horizontal position. The exact amount of displacement is shown by a pointer which moves over the graduated dial segment. This can be seen immediately below the table. All adjustments are secured by clamping levers which assure rigidity.

The machine is mounted on a pedestal, giving a height of 43" from the spindle center line to the floor. The tool rest tables measure 16" x 7" and are both adjustable.

One wheel head carries a silicon carbide grinding wheel 8" x 1- $\frac{1}{4}$ " x 1- $\frac{1}{2}$ " with steel back, having a surface speed of 7,000 feet per minute, whilst the other wheel head carries a diamond wheel 6" x $\frac{3}{4}$ " x 1- $\frac{1}{4}$ ", with a surface speed of approximately 5,000 feet per minute.

The K-20 Grinder is a single end machine, suitable for most purposes for the smaller users of Tungsten Carbide tools. The work table is 11" x 6" whilst the grinding wheel measures 6" x 1- $\frac{1}{4}$ " with center cavity 2- $\frac{1}{2}$ " in diameter.

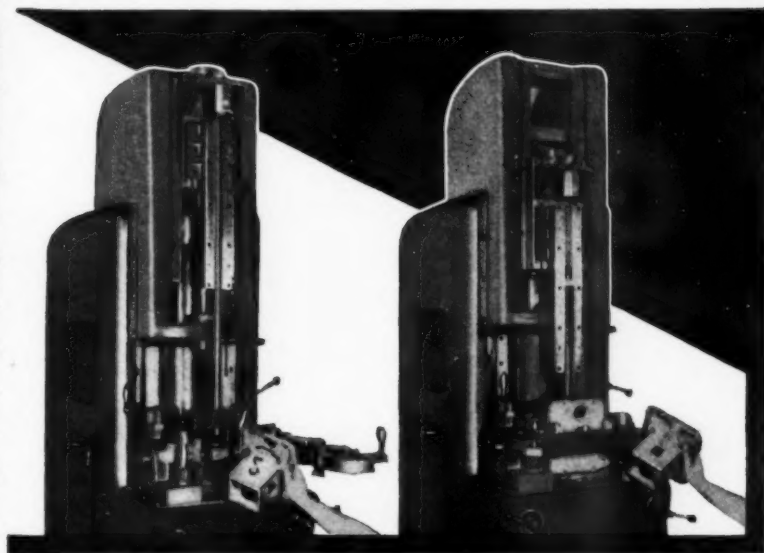


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ROUND BROACH *cuts* SQUARE HOLE

Take a tapered round broach and grind flats on four sides parallel to the broach axis so that the big end is square or rectangular, while the small end is round—and you have the simplest tool there is with which to accurately produce a square or rectangular hole of the exact dimension to which the broach is ground. The round portions do the cutting. The flats help to guide the broach.

For maximum accuracy, Colonial provides grooves in two of the flat sides which engage guide keys in the broach-handling mechanism. These guide the broach through its entire cut, eliminating deflection, reducing broach wear, etc.

Above is a case in point: The 1.375 by 1.500-inch rectangular hole in an otherwise finish-machined pump casting had to be held to within .002 inches for size and in relation to finish-machined faces.

The casting is located from the faces in a quick-clamping fixture and the machine is started. The broach-handling mechanism moves down—broach, guide support, and all.

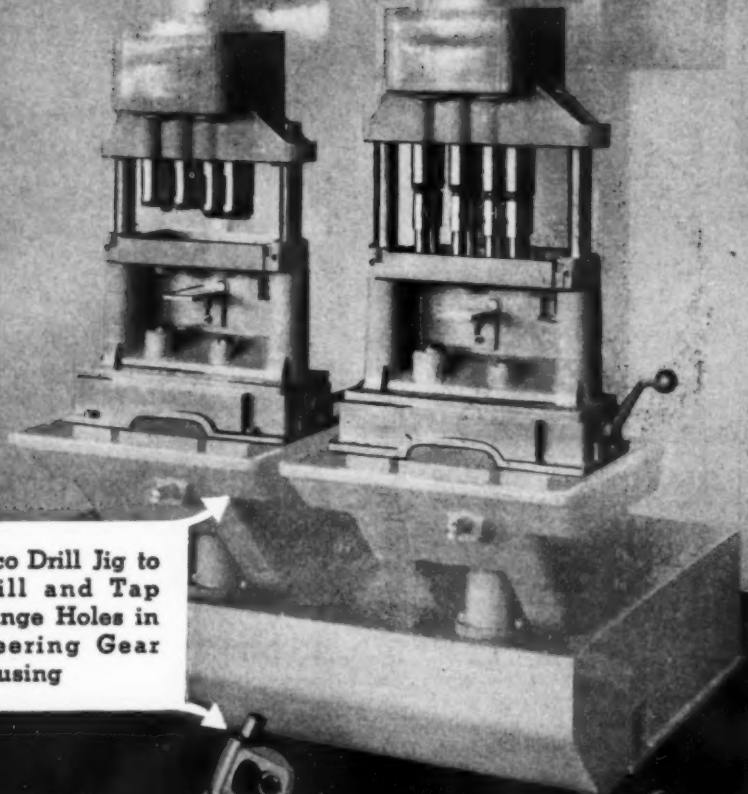
The automatic puller in the base of the Colonial 6-ton, 42-inch stroke hydraulic "Pulldown" engages and pulls the broach through the rough-bored 1.368-inch hole. In its down travel the broach is guided positively by keys in the guide engaging slots in two of the flat broach faces.

When the broach is pulled through, the hole is finished. The part is removed and the broach returned automatically into the guide support and upper broach-handling retainer. Production in this case is rated at 80 pieces per hour.

We will be glad to put you on the mailing list for "Broaching News." Just drop us a line.

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The Truth About Welding

By J. F. LINCOLN, President
Lincoln Electric Company, Cleveland

ARC welding has too many doctors. An operation which is perfectly natural, very simple and very easily accomplished, has largely been changed in the minds of the public to an art which takes on the mystery of voodooism with an admixture of the art of the medicine man.

The public is beginning to think that the welding operator is a cross between a miracle man and a professional musician. This opinion is groundless. The only thing a welding operator can do is to hold the electrode end at a certain distance above the deposited metal and advance it along the seam to be welded at a certain speed. There is nothing more involved in this operation. It is neither complicated nor difficult. As a matter of fact, with proper electrode, proper setting of the welding machine and proper preparation of the work, it is practically impossible to make a weld which will not stand up in service without having it so evident to the inspector that he would immediately reject it. It is possible to have defects in the steel that cannot be seen, which will make a steel structure dangerous. It is impossible, however, to make a weld on that structure which is dangerous without it being obvious to anyone looking at the weld.

The reason we hear so much about the necessity of skill and care in welding is largely due to the fact that the operation itself is so simple that it is difficult to find much about it to discuss in papers, lectures and statements. Therefore, many of these eccentricities which are volubly discussed in magazine articles, lectures and statements,

consist of theoretical possibilities which exist only in the minds of the lecturers and seldom exist in reality.

It is time that we got away from trying to make this very simple operation mysterious. It is time we recognized the fact that the metal deposited by the shielded arc electrode is definitely better than the parent metal it is joining. It is time we recognized that there has never been a failure on an insured pressure vessel made by the shielded arc process. It is time we recognized that in the usual design, if only half a weld is made, it will withstand all of the normal requirements of the structure. It is time we recognized that failures in welds, which are made by the methods recommended by any reliable manufacturer never exist. It is time we recognized that there is no mystery in welding and that making a welded joint is far more simple than making a riveted joint and more simple than making the steel joined together by this process. It is time we recognized that to spend time, money and attention in removing the least possible flaw from the deposited metal is silly in the light of the obvious flaws which must occur in the parent metal. A factor of safety is used to guard against these flaws. That is more than is needed in any commercial weld.

When we do recognize these facts, we will have done two things:—First, we will have given the green light to one of the most economical processes now known for the production of many structures; Secondly, we will have removed one of the fears which the uninitiated have developed regarding a perfectly normal manufacturing operation.

Extra

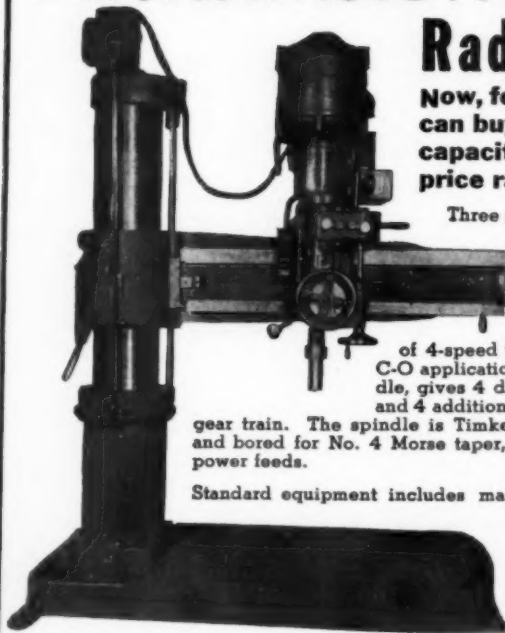
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Announces New



Radial Drills

Now, for the first time you can buy a radial drill with capacity of 1 $\frac{3}{4}$ " in this price range.



Three models are offered—9' column with 3' arm, 11' column with 4' arm, or 11' column with 3' arm. Either 1200 or 1800 r.p.m. motor on the 8-speed drilling head. The motors are

of 4-speed type, 2 h. p. capacity. The C-O application of motor direct on spindle, gives 4 direct speeds to the spindle and 4 additional speeds through the back

gear train. The spindle is Timken roller bearing mounted and bored for No. 4 Morse taper, with a range of 4 geared power feeds.

Standard equipment includes magnetic and drum control switches, with three-button starter station having forward, reverse and stop buttons. All tapping operations are done electrically by means of instantaneous control of the motor direction. Movement of arm on column is controlled by a two-way drum switch, with motor and gearing mounted on top of column.

Canedy - Otto Mfg. Co.

Chicago Heights, Illinois

For more information, write us.

Prefinished Metals Arrive

**A Broad Range of Base Metals and Finishes Provides
Pre-finished Stock for Almost Any Product**

By CARL C. STRUEVER

General Manager American Nickeloid Co., Peru, Ill.

JUST a little over half a century has passed since pre-finished metal was first made commercially available in the U. S. It was our privilege to introduce the first pre-finished metal in this country, and since then we have seen the industry grow and have watched the use of pre-finished metal spread into nearly every metal working industry.

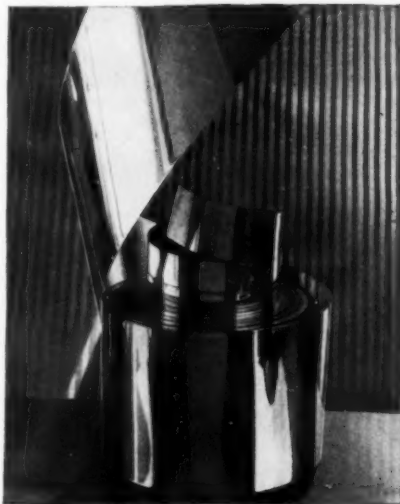
Today, there are few products without these industries that do not gleam with bright metal . . . used either as a structural part of the product, for purely decorative uses, or for a combination of both.

Some of this bright metal is pre-finished—some plated and polished after fabrication. Many of the manufacturers who used pre-finished metal found that for their particular conditions, it materially reduced the cost of production. Many of the other classes of manufacturers—those who do not use pre-finished

metal are only marginally aware of what pre-finished metal is. The promotional problem of this industry is an educational one . . . to explain what pre-finished metal is in terms of the manufacturers' own products. And this means in terms of how a certain pre-finished metal will "dress up" a percolator, a stove or an ice cream freezer; how it will stand up as a structural part of the product; and most of all, if the product can be produced for less by using a pre-finished metal.

And, as a rule, the manufacturer will, in each instance, judge the pre-finished metal against the corresponding results that can be obtained by using raw metal and plating it after fabrication.

Our own American Bonded pre-finished metals are commercial metals composed of nickel, chromium, brass, copper or steel—electro-plated either singly or in combination to base materials of steel, zinc, tin, copper, brass or



aluminum. The latter metals are known as the "base" metals and determine the classification of the metals as either "steel base," "aluminum base," etc. A pre-finished metal is, therefore, a combination of two or more metals. And this allows, in a sense, for the "making to order" of a pre-finished metal for some specific application.

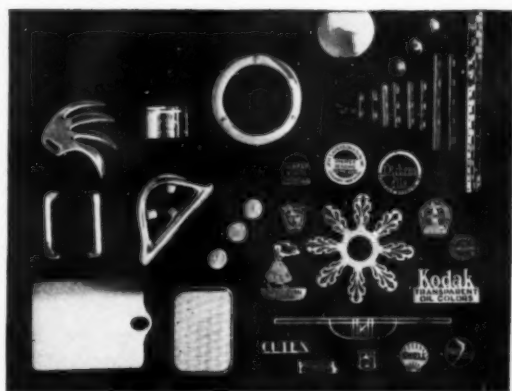
For instance, for an application requiring a metal which combines a brilliant, tarnish-proof and rust-proof finish with maximum lightness and strength . . . there is a Chrome Aluminum, formed simply by electro-plating a chromium finish to an aluminum base. In doing this, the most desirable qualities of both metals are combined for use. Alone, neither of the two metals nor any other would have possessed the necessary qualifications.

According to this rule,—keeping both the decorative and functional capacities of metal in mind—we manufacture over 14 different metals. This provides for the manufacturer a range in metal, finish and price to qualify for practically any product.

For instance, our own American Bonded line includes chrome zinc, nickel zinc, copper zinc, brass zinc, nickel tin, chrome tin, brass tin, copper tin, chrome steel, nickel steel, copper steel, brass steel, chrome brass, nickel brass, chrome nickel silver, chrome copper, nickel copper, nickel aluminum and chrome aluminum.

Each of these pre-finished metals is available in bright or satin finish, in stripes, crimpings, scorings or corrugations.

The various American Bonded metals are available in sheets, flat strips or coils to suit the production set-up of the manufacturer. The coils are available in widths from $\frac{1}{4}$ " up to 24" in steel base metals and in lengths to form a coil weighing as high as 2000



pounds when desired. Stock size for sheets in practically all metals is 36" x 96". The pre-finished metals are furnished in coil form to manufacturers who are equipped for continuous feeding to automatic machines.

The prefinished metal industry has reached maturity as it were, giving the manufacturer not only a wide variety of the finest quality material but giving to him in forms ideally adapted to modern straight line production.

The progress of pre-finished metal, for the most part, has been a very quiet affair. A pre-finished metal and a metal that has been plated after fabrication may be identical in appearance. Metal was being plated after fabrication long before pre-finished metals were commercially available. The nickel plating on an old pair of ice skates has much the same appearance as the pre-finished nickel finish on a modern kitchen item. For the most part, the consumers of metal products are unaware that such a thing as pre-finished metal exists, or that there are different kinds of pre-finished metals.

The general public, however, whether they call it modernization, streamlining or what not, has been conscious during the past decade of a new beauty—both functional and decorative—in products that were heretofore drab and color-



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Between the covers of "D-37" you will find the drilling machine you have been looking for—at a price you will be glad to pay.

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Experience gained in over a half-century of drilling machine manufacturing at your service—Let us help solve your drilling problems.

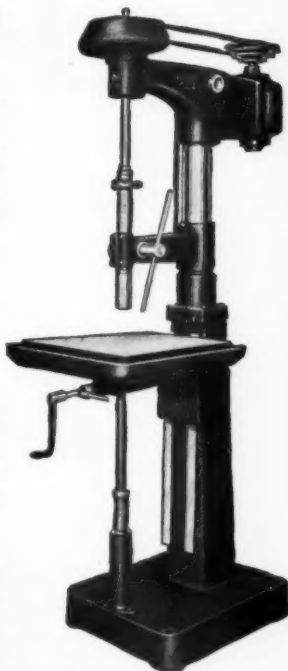
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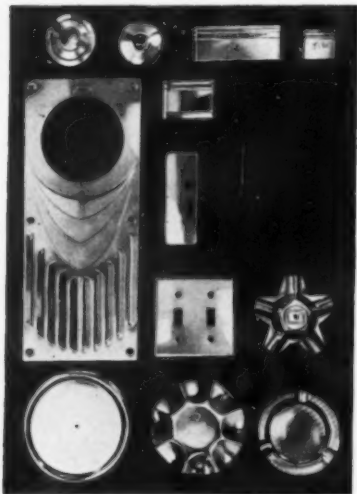
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less. Pre-finished metal—in its great variety — has been responsible in a great part for this change.



During this growth in the use of pre-finished metal it has been the privilege of American Nickeloid Co., to introduce many exclusive developments within the industry.

We were the first to introduce metal in coils, for continuous feeding to automatic machines.

For use where a firm's manufacturing process was unduly severe, we developed the "paper-adhered" feature for their metal. By this, a thin coating of paper is adhered to any American Bonded pre-finished metal and remains as a protection to the finish of the metal until after fabrication is completed. It then can be peeled off as easily as a banana skin.

The latest developments in pre-finished metals are the two new American Bonded Aluminum base metals—Nickel Aluminum and Chrome Aluminum. They are the first pre-finished aluminum base metals to be offered commercially and come after many

years of research in this field. These two metals were previously mentioned as combining the extreme lightness (in relation to strength) and toughness of aluminum with the brilliance and beauty of nickel and chromium.

Representative of the advantages obtained by combining certain metals is the fact that either of these aluminum base metals can be soldered with perfect ease. This capacity for easy soldering, it will be recognized, is remarkable in an aluminum metal and makes these two new metals outstanding developments.

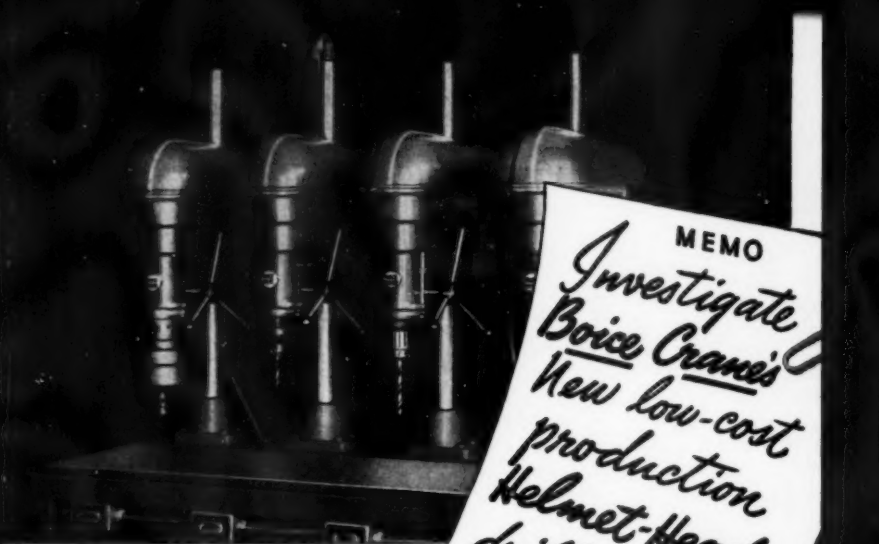
Also introduced by American Nickeloid Co., last year was a new line of low cost B and C grade steel base metals. This provides in the line not only a complete range of metals but



an almost equally wide range of prices.

There are manufacturing conditions and products for which the advantages of using a pre-finished metal become immediately obvious. There are others where the possibility of reducing production costs are not so obvious. For this latter class of manufacturers, we have prepared what we call the "Show Me" Test Kit. This kit provides a sufficient quantity of a pre-finished metal—selected by the manufacturer—to al-

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drill p
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paltry
reami
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COM
Bench



SUPER Light Duty Machines with fully enclosed drives. Built for longer, harder service. More rugged spindles; larger, stronger bearings; bigger, stronger mounted quills than light duty drill presses have had before.

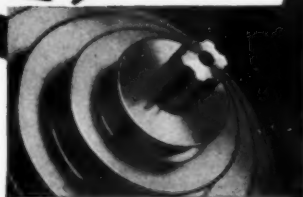
Helmet-Heads shave **BIG** amounts, not paltry little ones, off your drilling, tapping, reaming costs wherever used—amounts that fairly shout “**SAVINGS**” they appear so large on cost analysis sheets.

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Bench and Floor models. Two and four spindle manufacturing type units for consecutive operations. Other models have newest, fast reverse Tapping Heads with important new features that reduce setup time and tap breakage.

For maximum economy on the very lightest jobs, use our standard No. 1600 series Drill Presses. Made in same range of types and models as Helmet Heads.

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New low-cost
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Modern, Ball-bearing, Silent Motor Drives increase efficiency of machine and operator. Power is directly applied to run cutting tools and punch presses at full capacity. None is lost in belt slippage, line shaft friction or vibration. No flapping belts, no growling, noisy line shafts distract the operator's attention from his work. Ball bearings bring freedom from friction.

Modern Motor Drives are fully adjustable, both as to belt tension, and to insure 100 per cent alignment between drive and driven pulley on precision centers. Write for complete information on Modern Motor Drives, or tool, die, fixture or stamping requirements.

**QUALITY HARDWARE
& MACHINE CORP.**

5849 North Ravenswood Avenue,
Chicago, Illinois

low him to make a conclusive test in his own plant, on his own product, with his own equipment. We, of course, stand by to offer any information or help we can and encourage the manufacturer to keep accurate records of his production costs during the test.

We feel that this is a boon to the pre-finished metal industry as a whole because it encourages consumers to give pre-finished metal a real "try." Of course, no expense or obligation is involved for them.

A Flexible Speed Control

To solve a recent speed control problem for the operation of a very heavy machine, two Lewellen transmissions were used. One unit controls spindle speed—the other, feed screw speed.

The spindle control may be set for any desired speed. When the stop button is pressed, the spindle is reduced to minimum speed before the motor circuit is opened. Should the machine be stopped suddenly, the spindle will return to slow position before starting. Thus the spindle always starts at the slowest speed, then accelerates at a controlled rate, to the preset operating speed.

Since the operation generates a certain amount of heat, the temperature of the material increases thereby causing it to elongate gradually and slowly. The speed of the feed screw is accelerated automatically and minutely, at the rate of elongation, to maintain operation at a constant rate.

Address Lewellen Mfg. Co., 1065 E. 10th St., Columbus, Ind., for further details.

World's Lowest Cost STAMPINGS in small or large lots

Special: Total die and stamping cost for 1000 flat blanks most any shape up to 10 sq. in. **\$25.00.**

We can save you money on all types of sheet metal parts in small quantities.

All types of dies designed and built.

SOUTHERN PRODUCTS
Dept. H10 INDEPENDENCE, MISSOURI



No. 16 TOGGLE PUNCH PRESS

The No. 16 TOGGLE with large die space is suitable for punching and shearing tie plates, punching and straightening splice bars, also for general manufacturing press, punching and shearing articles. Drive is mounted inside of frame.

The Press is equipped with magnetic or air clutch. This is a high speed heavy duty Press for many applications.

GENERAL DIMENSIONS:

	No. 16	No. 16A	No. 16B
Face of slide, right to left.....	43"	53"	62"
Face of slide, front to back.....	24"	26"	26"
Die space, slide down.....	20"	20"	20"
Stroke; Standard.....	3"	3"	3"
Maximum.....	5"	5"	5"
Face of table, right to left.....	53"	60"	66"
Face of table, front to back.....	24"	26"	26"
Capacity.....	700T	850T	1000T
Strokes.....	40	35	30
Depth of throat.....	15½"	15½"	15½"
Weight.....	76,000	82,000	88,000 lb.
Motor required			
Horse Power.....	20	30	40

**BEATTY MACHINE &
MANUFACTURING CO.**
HAMMOND, INDIANA

ALSO BUILDERS OF

Punches: Single and

Double—"C" Frame

Horizontal Punches

Multiple Punches

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Splitting Shears

Coping Machines

The CoPun Shear

(Cope Punch Shear)

Vertical Bulldozers

Spacing Tables

Hydraulic Press Brake

and Flanger.

Hydraulic Presses.

Chromium In Industry

Hard Chrome Plating Extends Life Span of Many Industrial Tools and Parts, Improving Their Performance

THE performance and life of piercing punches seems to be in proportion to the smoothness and hardness of the outside surface. That was the conclusion to be drawn from Mr. J. A. Smith's article on Piercing Punches in the March issue.

Mr. Smith related his experiments with punches of various Rockwell readings. From these he concluded that little was to be gained from hardness alone, beyond about 65 Rockwell.

Next, he figured that vertical lapping would remove the circular grinding marks, putting a superfinish on the working end of the punches.

He found that a lapped punch did pierce a number of holes with smoother walls than a punch ground in the regular way. Soon, however, he found that lines began to show in the holes made with the lapped punch. Examination of the punches under a microscope revealed tiny metal particles welded to the punches. Different degrees of hardness and different steels all showed the same condition. Punches break in pulling out of the die—rather than in piercing, and undoubtedly the roughened exterior after continued use is a major factor in causing the punches to stick and break.

Armoring the Surface—

The next step was to hard chrome plate the punches and the results were gratifying indeed. Using the same material on which a regular punch would show the pit marks after four or five holes, the chrome plated lapped punches

ran 2500 holes without apparent signs of usage.

Next chrome plating was tried on standard ground punches, with slight improvement.

This led to the conclusion that the regular method of grinding leaves minute ridges on the punch surface. The high points of these ridges break off or wear off, leaving bare punch metal exposed to the "galling" or "firing," the same as if no chrome had been deposited. Vertical lapping before plating removes these ridges or high spots, giving a smooth, uniform surface for the chrome deposit, accounting for the vastly increased life and improved performance of the superfinished chrome plated punches.

Hard chrome plating has shown similar results in the case histories of many other hard working tools and machine parts. These include tools of many different kinds, such as dies, broaches, lead screws, rollers, cams, moulds, gauges, shafts, pneumatic tool parts, etc.

What Is Chromium?

Chromium is not a cure-all. It must be applied properly, and to the proper parts to attain maximum results. Chromium has many valuable properties. Its hardness is given in Moh's scale as 9 compared with a rating of 10 for the diamond. Its coefficient of friction is approximately 40% that of hardened steel and its melting point is 2750° F. It is immune to most acids and it will not gall to any of the other

Less Tap Breakage

More Accurate Tapping

With the New "Proconier" High Speed Tapping Heads
and the "TRU-GRIP" Tap Holder



Weighing less than $\frac{1}{2}$ of the conventional tap holders, compact and accurate—the new Proconier TRU-GRIP tap holders practically eliminate tap breakage and permit new standards of accuracy in tapping. New plant records for economy and accuracy are being made with this latest type improved tap holder—together with the Proconier High-Speed Tapping Heads which alone offer all these features: Dry, double-cone friction clutch that won't wear and can't absorb oil; makes bottom tapping easy; ball bearings; three point balanced, heat-treated gear reversing mechanism, which distributes pull and greatly reduces strain—and other important features.

SEND FOR BULLETIN

giving full details, description and prices on complete line of Proconier Precision Tapping Heads to meet all needs, the new TRU-GRIP Tap Holder—and also the full line of Proconier Universal Tapping Machines, hand foot or air operated.

Proconier Safety Chuck Co.
14 So. Clinton St., Chicago, Illinois

Send me Bulletins on: ☐ High Speed Tapping Heads ☐ True-Grip Tap Holders ☐ Universal Tapping Machines.

Name

Address

City State

PROCONIER

SAFETY CHUCK CO. 14 S. Clinton St. Chicago, Illinois

base metals. This latter property is a valuable aid to lubrication.

It is mined as an ore and its first extensive use was in the manufacture Haynes (inventor of Stellite) developed of Stellite about 1916. Shortly after the close of the World War Ellwood Haynes (inventor of Stellite) developed what is now known as stainless steel, which further increased the use of Chromium.

Chromium plating for decorative

work differs greatly from hard Chrome plating. Decorative plating is seldom over .003" thick, usually is not finished after plating, and as a rule, is applied on a copper or nickel base.

Hard plate is different. It requires different equipment and a different technique. It is applied directly on the base metal which is frequently steel. It can be applied up to as thick as .045" successfully, and is usually finished to size afterwards by grinding or lapping. Due to the hardness and density of the Chrome, leading abrasive manufacturers have developed special wheels which facilitate the grinding of chromium. It can be ground either wet or dry, according to the part, and while difficult to lap, a finer degree of finish can be obtained than on any other metal.

Considerable data on methods and applications of chrome plating is presented in booklets published by the Master Chrome Service, Inc., 5609 Herman Ave., N. W. Cleveland, Ohio.



Severance
GROUND-
Govern
the World Of
ROTARY FILES
WHY?

Because Severance originated these cutters — offers the greatest variety of shapes in the widest range of sizes — Maintains the world's largest stock, assuring quickest possible delivery — of both standard and Special Ground H. S. Rotary Files.

Ground Cutters increase production by 50% minimum per hour.

Ground Cutters last three times as long (minimum) as Hand Cut or Mill Cut Rotary Files and can be reground many times.

Write for catalogue No. 12.

Severance Tool Manufacturing Co.
1510 East Genesee Ave. Saginaw, Mich.

Small Ajax Coupling for High Torque Jobs

Two new Ajax forged steel flexible couplings with 1-1/8" and 1-5/8" maximum bores are announced.

Flanges are forged from SAE No. 1020 steel. They are specially designed to meet the present trend of using alloy steel shafts carrying a high percentage of their torque capacity.

Complete information is available by writing Ajax Flexible Coupling Co., Westfield, N. Y.

BENDS ANY RADIUS FROM 0 TO 3"

A UNIVERSAL BENDER For BENCH Use

A sturdy, portable, precision tool for job or production use. Forms round or flat wire, rod, tube and strip stock. Bends loops, eyes, hooks, springs, angles, and corners. Set-ups readily changed from one job to another with assurance of accuracy and minimum time to change.

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O'NEIL-IRWIN MANUFACTURING CO.

Manufacturers of Precision Bench Shears, Rollers, Folders, Presses, Nibblers, Benders, and Bar Cutters.

316 Eighth Ave. South, Minneapolis, Minn.



Mall

TRADE MARK

FLEXIBLE SHAFT GRINDERS

A heavy-duty flexible shafting delivers an abundance of power to the working tool. The same power unit can be used for SANDING, WIRE BRUSHING, POLISHING and GRINDING.



Close up view of angle spindle with cup wheel smoothing surface welds.

MALL 3524-D $\frac{3}{4}$ H. P. grinder
Other models $\frac{1}{2}$ H. P. to 3 H. P.



- ★ Place 2 to 3 times the power in operator's hands—with no dead weight — assuring better work with less effort.
- ★ Cut Power Costs.
- ★ Slash Time and Labor costs.
- ★ Easily wheeled right up to the job.

WHAT YOU GET IN MALL GRINDERS

Large, husky, constant speed, aluminum frame, ball bearing motors, available in ventilated or dustproof types with 100% overload capacity.

Speed, Lightweight, Portability.

Heavy duty flexible shafting.

Two to three times more power in the operator's hands.

Built for long life, trouble-free service.

Fast and efficient production tools for all types of industrial grinding and finishing. They eliminate the need for costly compressed air and make power from the constant speed, aluminum dust and frame, vaporproof or ventilated type ball bearing motors available in any position.

Write TODAY for FREE demonstration and full information.

MALL TOOL COMPANY

7742 SOUTH CHICAGO AVENUE CHICAGO, ILLINOIS

Lincoln Foundation Awards

WIDESPREAD interest was aroused by the recent announcement of the Lincoln Arc Welding Foundation \$200,000 Industrial Progress Program Awards. These are for the best reports describing advances and improvements made between now and June 1, 1942, by the application of arc welding to industrial work, including design, manufacture, fabrication, construction, welding service and maintenance. The product may have arc welding actually applied to it within the period, or it may be designed or redesigned within that period to utilize the arc welding. In any case, the re-

port is to embody a design and description covering the advances and improvements.

While the program is for the entire industrial field, actually it comprises 46 individual award programs, each having four awards of its own while being eligible automatically for certain other awards—four in the particular group of 12 in which it falls, three in the main award group, or receiving no other award, 223 in the honorable mention group.

For the field covered by the Machine Tool Industry, there are four awards amounting to \$1600 definitely designated for subjects in this field. These are composed of one award each of \$150, \$250, \$500 and \$700 for studies of Jigs and Fixtures.

There are four other awards amounting to \$6800, comprising one award each of \$800, \$1000, \$2000 and \$3000 in the Functional Machinery Group.

Twelve other awards totaling \$10,000 are offered for the best studies of plant or equipment maintenance, including machinery or mechanical equipment. There will be two awards each of \$150, \$250, \$500 and \$700 and one each of \$800, \$1000, \$2000 and \$3000.

In the main award group are three other major items of \$5000, \$7500 and \$10,000 for the best papers in the entire program.

A total of \$22,300 is also offered for 223 studies of merit which receive no other award.

Complete information may be obtained by addressing The James F. Lincoln Arc Welding Foundation, Cleveland, Ohio.




Air CYLINDERS and VALVES

We've been making them for our own machines for 25 years. Exclusive design...without tie-rods. More compact! Heads removable without disassembling entire unit. All cylinders cast iron, machined and honed. All diameters, lengths and mountings. Hand valves; foot pedal valves; electric operated valves and our own exclusive design automatic self-operating valves. *May we quote you on your requirements?*

The Bell Machine Co. 61 Jackson Dr. Oshkosh, Wis.

Typical DRIVE-ALL Installation in a Detroit Plant



Brackets Carried
in Stock for
Motorizing all
Types of
Machines

Price of 3-Speed Gear
Box with Brackets

\$87.50

4-Speed Gear Box
\$10.00 Additional

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DRIVE-ALL MANUFACTURING CO.

3401 Conner Ave.

Detroit, Michigan

The Cleveland Show

WHAT promises to be one of the year's largest and most impressive showings of production equipment and machine tools is scheduled for June 25-29.

The place selected is the big Public Auditorium in Cleveland, Ohio.

At this convenient time in the pre-vacation season, and at this handy central location, attendance should be large.

A sufficient number of exhibitors have already contracted for space to insure a representative and outstanding display. Additional exhibitors are signing up each day.

The show will give visiting engineers, production executives, tool designers and industrial people generally, an opportunity to examine and study the latest developments in tools and manufacturing equipment. They will see innovations and improvements, refine-

ments and radically new developments that will help in turning out all kinds of work better, faster and more economically. Under one roof they will find gathered together a well balanced and wide range of interesting new tools, equipment, devices and accessories—up-to-the-minute products of this streamlined mechanized age. There will be many worth-while educational features.

In view of the recent upturn in general business conditions and the widespread interest in improving manufacturing facilities, it behooves production men to keep posted on the latest developments in machines and methods—and where is there a better opportunity?

It is emphasized that the show has sufficiently strong financial backing to assure that it will become an annual event.

SAWING and FILING operations are handled

with equal **EASE, EFFICIENCY
AND SPEED ON THE OLIVER
DIE MAKING MACHINE.**

A tried and proven method and machine—one that will pay for itself in 30 days if kept busy.

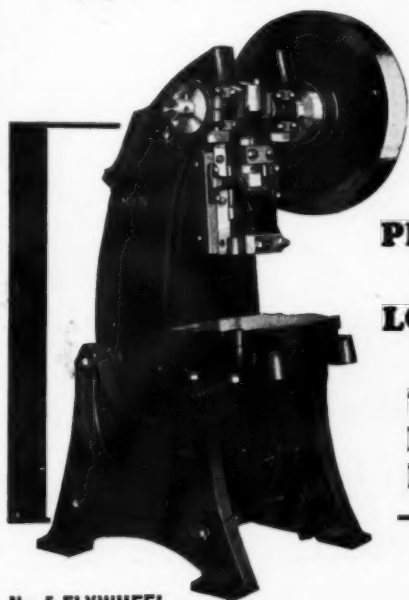
A real time saver—helps on those rush jobs—just the machine to relieve the rush in your tool room.

**SEND FOR BULLETIN
PRICES BEGIN AT \$125.**

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**No. 5 FLYWHEEL
TYPE**

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**BETTER
PRODUCTION**

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LONGER LIFE

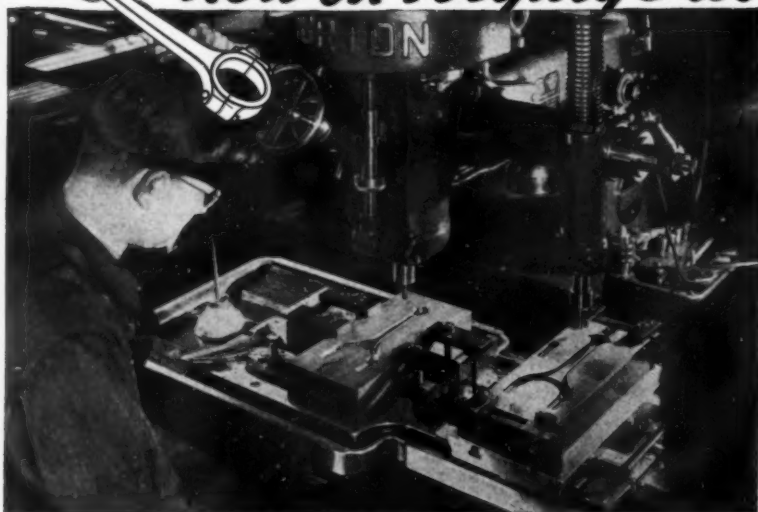
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**THE MOST
FOR YOUR
MONEY**

The Marshalltown Line includes inclinable presses from 5 to 70 ton capacity.

From every standpoint, the Marshalltown Line of Presses are "tops". They are sturdy, dependable, engineered and built to highest quality standard. Features of design include more die space, chrome nickel cranks, wrist pin connections and many other superior advantages. Literature fully describing this sturdy, dependable line of presses will be sent on request. It will pay you to investigate.

MARSHALLTOWN MFG. CO.
900 E. NEVADA ST., MARSHALLTOWN, IOWA

New on Forging Dies



GORTON DUPLICATORS

The illustration shows a Gorton Duplicator working on a connecting rod coin forging die. The producers of this die had tried several methods of quantity reproduction to close limits and found that the required speed, accuracy, and economy were possible only with Gorton equipment. Send for bulletin No. 1319-B.



Mail Coupon Today ➔

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Engineering Research Dept.
1115 13th St., Racine, Wis.

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Duplicators.

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GEORGE GORTON MACHINE CO.
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What's New in the Industry

Cincinnati Dial Type Milling Machines

The Cincinnati Milling Machine Co., present a line of new plain, universal, and vertical dial type milling machines. Three sizes, Nos. 2, 3, and 4 and "medium" and "high speed" feed ranges are offered. They are designed for rapid metal removal to a good finish and close limits of accuracy, with convenient and easy manipulation of operating controls.

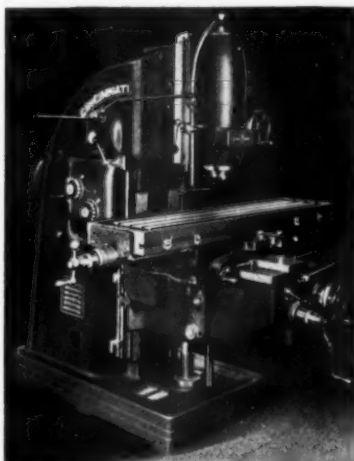
All power control and hand adjustment levers are conveniently grouped at front operating position, providing complete control of machine without the necessity of the operator walking a single step or stretching his reach. All these controls, both hand and power, and their accompanying advantages, are duplicated at the rear working position (at the left-hand side of the column).



Both cross and vertical power controls are near top of knee.

Power longitudinal, cross, and vertical feeds are engaged by independent feed levers. They are directional controls, i.e., the feed movement is in the direction in which lever is moved.

All sizes and styles of the machines have power rapid traverse in six directions.



Spindle mounting conforms to the familiar Cincinnati design of four anti-friction bearings; two at front and two at rear end. Rear bearings are mounted in a sleeve to permit normal expansion and contraction in length of spindle.

All parts within column and knee units are automatically lubricated, while the parts within saddle are lubricated by a single oil-shot system.

Column is heavier, wider at base and at overarm, and is made of Mee-

hanite metal. Heavy ribbing throughout increases its strength, permitting the operator to run machine at maximum cutting capacity. In keeping, the overarm has been widened; there are more clutch plates in the main drive clutch.

A new hydraulic device has been incorporated with spindle drive starting lever. Connected with the link mechanism, a hydraulic Servo control takes over the work of engaging clutch, relieving operator of all starting effort except a light touch on the starting lever. This permits spindle to be "inched" along with negligible effort. Other advantages ensue. There is positive and full engagement of clutch when spindle is rotating; engagement is instantaneous; and, since the Servo control also operates spindle brake, spindle rotation stops instantaneously when clutch is disengaged.

Micrometer dials have been redesigned. Finely spaced face clutch teeth, having a triangular cross section, engage mating teeth in sleeve on adjusting screw. Spring pressure keeps them in engagement. When necessary to reset, they may be pulled out a slight distance against the spring pressure, rotated the desired amount, and then released.

Another major safety feature will be found in the rear motor cut-out switch. If operator opens hinged cover for a belt tension adjustment or a routine motor inspection, and has forgotten to shut off power, a cut-out switch immediately breaks the circuit.

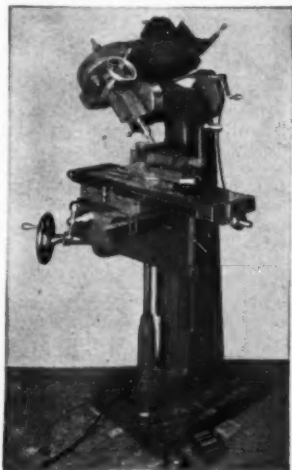
A new type of brace is included as standard equipment with horizontal machines. It clamps to the exposed top surface of knee, and therefore may be set as close as desired to saddle. With this design, the operator may take advantage of the combined rigidity of short arbors and brace.

For machine tools, a rather extensive use of plastics has been made. The large speed and feed index dials at side of the column have white numbers on a red plastic base. All power control levers terminate in black plastic knobs.

A catalog No. M868 is available if you write them at Cincinnati, O.

Blank & Buxton Offer New Model

A new index No. 40-H Combination Mill and Locator is announced by Blank & Buxton Machinery Co., Jackson, Mich. It is designed for end mills $\frac{1}{8}$ " to $\frac{3}{4}$ " in tool steel.



The attractive highlights include a super precision preloaded ball bearing spindle having No. 9 Brown & Sharpe taper and mounted in quill with $3\frac{1}{4}$ " vertical travel, obtained through screw and nut.

Swivel head is 7" in diameter at mounting point, and graduated 90° both ways, right and left.

All screws are equipped with dials and graduated in thousandths.

Cross and longitudinal slides are equipped with verniers for locating.

Table travel:—cross $8\frac{1}{2}$ "—longitudinal 16"—vertical 15".

Spindle speeds: — 180-330-600-800-1300-2400 r.p.m. Higher speeds are available through special pulleys and high speed motors.

Hole through spindle is $\frac{3}{4}$ ". Table working surface—8" x 20" and table over all length—30".

It is possible to bore 3" holes in steel with flycutter or eccentric boring head.



DOUBLED SERVICE—HALVED COST

Designers today, employing modern materials, are frequently able to satisfy requirements formerly considered mutually exclusive. A case in point: fishing spear bodies, used in oil well drilling, must be strong and have a high degree of hardness to resist abrasion. The latter quality made them costly to machine — until the manufacturer adopted Nickel-Chrome-Molybdenum (SAE 4340) steel.

This steel is heat treated to a high degree of combined toughness, fatigue strength and hardness (375-400 BHN). But what, in this case, proved especially

important, it can be so readily machined at the specified hardness that the tools used last about twice as long as formerly, thus halving the tool cost.

This instance of Nickel-Chrome-Molybdenum meeting the double requirement of high serviceability and low fabrication cost is typical of the results achieved by the employment of modern materials. Rechecking your own specifications may disclose similar opportunities. Our helpful booklet, "Molybdenum in Steel," will be sent free on request to engineers and production executives.

PRODUCERS OF MOLYBDENUM BRIQUETTES, FERRO-MOLYBDENUM, AND CALCIUM MOLYBDATE

Climax Molybdenum Company
500 Fifth Avenue, New York City

MOLY

Giant Press Brake For Aircraft Industry

This 340 series All-Steel Cincinnati press brake, manufactured by The Cincinnati Shaper Co., Cincinnati, O., is claimed to be the largest press brake ever built for the aircraft industry. Housings, bed, and ram are of rolled steel plate. Distance between the housings is 18'6" and the total overall die surface is 21'3". It is equipped with taper adjustment to the ram, air counter balances, tonnage load indicator, electric clutch control and automatic electric overload clutch release. This press brake was recently installed in the Alcoa, Tennessee plant of the Aluminum Company of America for corrugating and forming aircraft aluminum alloys.



Because the press brake is particularly suited for corrugating large metal sheets on a practical production basis, the builders of military and transport planes, and their suppliers, use press brakes for corrugating fuselage and wing stiffeners and for forming channel sections, cap strips and wing tip sections.

Phillco Degreasers

Portable Phillco Degreasers are now being marketed by the Phillips Mfg. Co., 352 W. Huron St., Chicago, Ill.

The model 36-3, shown, is 36" x 30" x 33" in size, and operates on 220 volt,

a. c. current. Solvent capacity is 10 gallons. A power driven flusher is provided for flushing off heavy grease and dirt on all types of metal parts. This is exceptionally useful for flushing parts which are highly coated with buffing rouges, drawing compounds, and various types of waxes.

The solvent is vaporized in a small sump tank. Parts to be degreased can be placed in the basket within the



Plain Type

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AUTOM

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MARK



Offset Type

CONTINUOUS HINGES

All hinges shown can be furnished with special holes, cutouts and bends to blue-print in metals to suit the job.

**AUTO MOULDING
& MFG. CO.**

**2326 S. CANAL ST
CHICAGO**

SPECIFICATIONS:
Open Width $\frac{3}{4}$ " to 6"
Gate Material .040 to .125
Pin Diameter .101 to $\frac{3}{16}$
Lengths to 120"

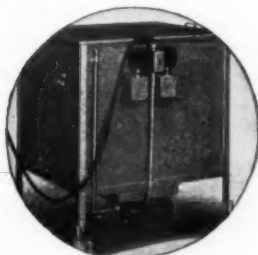


THREE-FOURTHS OFFSET.



SEMI-OFFSET

cleaning tank, and condensation of vapors on these parts supplies the degreasing action. As the vapors condense, they run off the part, taking the oil and grease with them.

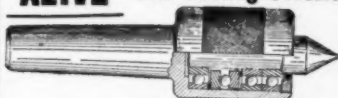


The 36-3 is claimed to turn out between three and six tons of work per day under normal conditions, for an approximate cost of cleaning, including solvent and electrical energy, of \$1.25 per ton.

A smaller unit, which is cylindrical, has a solvent capacity of three gallons, and an output of about one ton per day, for approximately the same operating cost.

The solvent used is a chlorinated hydro carbon, which vaporizes at 250° F. This solvent is said to have a distinct advantage over other solvents which vaporize at lower temperatures and do not give so long a degreasing action.

"ALIVE" Ball Bearing Centers



"They turn with the work"

Write TODAY — and let us tell you more about them.

MODERN MACHINE CORP.

323 Berry St.,

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Special Anti-Mushrooming Anti-Chipping Heat-treat

Oversize Shanks ▶

Exclusive

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Corners



and
a
complete
line of
Marking
Devices

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STAMPS, Inc.**

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Our new modern plant is fully equipped
with special machinery for

**COMMERCIAL JIG BORING,
DESIGNING AND BUILDING**

of
**DIES, JIGS AND FIXTURES
LARGE OR SMALL**

We can handle your Jig Boring jobs at
reasonable prices on our new 18"x36" Pratt
& Whitney Jig Borer. Quick service.

Have been delivering satisfaction since
1929—let us serve you.

QUALITY TOOL & DIE CO.

Ray W. Rice, Manager,
401 N. Noble St., Indianapolis, Ind.

Hannifin 25 Ton Forcing Press

Hannifin Mfg. Co., 621 South Kolmar



Ave., Chicago, has developed a new hydraulic forcing press of 25-ton capa-

city, featuring welded steel frame construction, built-in motor driven hydraulic power unit, and the Hannifin sensitive pressure control which provides infinitely variable pressure, from a few pounds to full capacity, controlled by a single finger tip control lever.

Welded steel frame construction with the hydraulic power unit completely enclosed within the frame, gives improved appearance, simplifies installation, and reduces floor space required.

The press illustrated is of 25 tons capacity, with stroke of 24". The table is 30" x 22"; gap 25"; reach 15"; and overall height 113". Table to floor is 40". Operating speeds are 83" per minute power stroke, 157" per minute return stroke. The hydraulic power unit is driven by a 10 h. p. motor.

"Doall" Offers a New Gauge

The Doall Height and Depth Gauge is a new product recently announced by Continental Machines, Inc., of 1301 Washington Ave., South, Minneapolis, Minn.

An immediate advantage of the gauge is that it makes for easy reading, with

BURKE

MILLING MACHINES

Make Fast Work of Small Jobs

Motor
Driven

Timken
roller or
ball bear-
ings to
spindle

Write today for
circulars.



Burke Machine Tool Co.
297 E. 16th St.,
Conneaut, Ohio

The M-B "Utility" Pneumatic Grinder. Model U.—T. R.

A 60,000 R.P.M. Unit



A WORTHY COMPANION TO OUR
FAMOUS "SUPER SPEED" MODEL
S. S.—S. R.

SPECIAL GREASE SEALED BEARINGS
NO LUBRICATION REQUIRED.

AN ABUNDANCE OF POWER.

OTHER MODELS, ALSO AIR LINE FILTERS
AND AUTOMATIC AIR LINE
LUBRICATORS.

Write for details.

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Going Places To Do Things



Drilling and
Tapping -
Singly or
in Multiple



**CONTINUOUS PROCESSION OF DURO
DRILL PRESSES ARE CONSTANTLY ENROUTE
TO SERVE INDUSTRY LARGE AND SMALL**

They are going into up-to-date factories where the managers realize the importance of having modern high speed drilling and tapping equipment—equipment that is designed and built for adaptability, large capacity and permanent accuracy.

Extra-heavy, precision machined, gray iron castings; large six-splined spindle mounted on four New Departure Ball Bearings; Jacobs Chucks and many other features are combined to produce Drill Presses that meet with immediate acceptance by production men interested in reducing costs through increased output with minimum rejection loss.

Write for description and prices on these low cost Drills—

Made by

The Manufacturers of America's Finest and Most Complete Line of Power Driven Machinery.

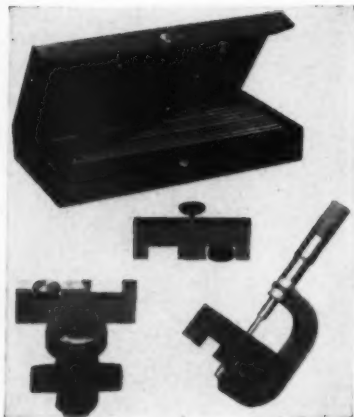
DURO METAL PRODUCTS COMPANY

Dept. BB5

2655 N. Kildare Ave.,

Chicago, Illinois

DURO DRILLS *are
A Better Buy*



micrometer accuracy, of the most inaccessible places. It is furnished with rods which measure up to 6".

As a depth gauge, or as an inside parallel surface gauge, the measuring

rods are locked into accurate position after the measurement is taken. The accurate depth obtained is then quickly read from a micrometer. No need to add or subtract to get a reading.

Besides its use as a measure for inside dimensions, the gauge also is used for height measurements, in which case the special height pin is inserted in the gauge in place of the measuring rods. With the height attachment, the gauge can be used for making accurate layout lines which are especially helpful for operations under magnification, since the gauge does not tear the metal.

A three point contact is maintained whether it is used as a height or depth gauge, or for measuring inside parallel surfaces. This makes for extreme accuracy of measurement at all times. An interesting use is for checking the dimensions of stampings. It is also used in place of a production gauge for checking small quantities of parts.

The gauge is available in the deluxe set, complete with the disc scriber, and measuring rods for up to 6" capacity, in a velvet lined case.

DESMOND GRINDING WHEEL DRESSERS & CUTTERS



We manufacture the only complete line of Dressers and Cutters. Also a complete line of Machinists' and Utility Vises. Write for catalog and name of your nearest dealer.

DESMOND-STEPHAN MFG. CO.

URBANA, OHIO

Canadian D. S. Mfg. Co., Ltd.
Hamilton, Ont.

No. 0 Motor Driven Hand Feed Surface Grinder

For Small
Precision
Work
5x12" Table
6x1½" Wheel
½ HP Motor

Send For
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Gallmeyer & Livingston Co.

405 Straight Ave., S. W.

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CENTRIFUGAL COOLANT PUMPS AND BY-PASS OIL RELIEF VALVES

The ideal, efficient units for installation where space is limited.

These compact, quiet units can be depended upon for long life and high efficiency.

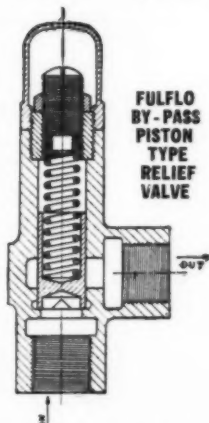
Flexibility in installation is assured through ability to provide for exactly the position of discharge required.



Symbol FVM
Vertical Type



Symbol FHM
Horizontal Type



FULFLO
BY-PASS
PISTON
TYPE
RELIEF
VALVE

The Fulflo By-pass Piston Type Oil Relief Valve is made in either cast iron or bronze, with pipe sizes from 1/4" to 2" and are suitable for pressures up to 350 lbs. They are equipped with either brass, hardened steel, or stainless steel pistons.

*(Complete Information on the "Fulflo"
Line Sent Upon Request)*

THE FULFLO SPECIALTIES CO., INC.
BLANCHESTER • **OHIO**

Final Processing Odd Shapes

In many plants—final grinding and polishing of pieces before assembly is a tedious, costly operation. Particularly with pieces odd in size and irregular in shape. Then the final processing is apt to "bottle-neck" the production line.

huge stainless steel bowls, 22" in diameter and 10" deep.

Many of these require a flawless, mirror-like finish, both inside and out!

Ordinary methods of holding for grinding and polishing were not only tediously slow, but resulted in scratches



A case in point is that of a cream separator plant. The product is an assembly of a large number of pieces of a variety of shapes and sizes, ranging from small cups, plates and discs to

and abrasions, which later had to be taken out by hand.

In this situation, the manufacturer turned to special-purpose speed lathes for a solution.

The result was a battery of eight speed lathes, employing specially designed vacuum chucks for holding the work. Today all the bowls and discs for two sizes of cream separators are handled satisfactorily by this battery of speed lathes.

The lathes were made by Schauer Machine Co., 2064 Reading Rd., Cincinnati, O., and are provided with single or two-speed motors, of one or two h. p., depending on the work to be handled. A thermal switch and overload relay is standard electrical equipment. An automatic braking system stops the motor in two seconds at high speed.

Durakool Announces Unbreakable Mercury Relay

The new Durakool Mercury relay utilizes the unbreakable metal body of the Durakool Mercury switch and the displacement principle with solenoid actuation.

The contact structure is hermetically sealed, permitting use in corrosive or explosive atmospheres. It is claimed

MADE OF ALLOY STEEL MILLED FROM BAR

SOCKET HEAD
CAP SCREWS



SAFETY HOLLOW
SET SCREWS

*Try Them On Your Next Job!
Or Write For Samples Today.*

**ECONOMY
MACHINE PRODUCTS
COMPANY**

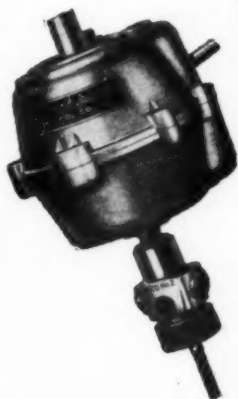
5207 Lawrence Ave., Chicago, Ill.

Tapping Insurance

THE ONLY TAPPER WITH A LEATHER CLUTCH

Ettco-Emrick

Seven Sizes
From No. 1
to 1 Inch Taps



As yet we have found no substitute to equal the smooth, consistent super-sensitive action of leather for the exacting requirements of tapping.

The Tappers have ball bearing spindles—needle bearing intermediate gears and all helical gears to insure the greatest possible speed.

Ettco Tappers may be furnished with Quill Clamps for all Modern Drill Presses.

The Tap Idles "In"—Not Reverse—
 This means better holes and more Tap Life.

Write Today for complete information.

ETTCO TOOL CO.

594 JOHNSON AVE.,
DETROIT

BROOKLYN, N. Y.
CINCINNATI

CHICAGO



For Machine and Tool Work & Quick Set-Ups

The only 3-way reading precision indicator. Accurate in either direction. Feeler mounted in centered cone bearings. .014 reading. New improvements.

Price \$5.00

Write for folder.

J. R. Reich Manufacturing Co.

334 Triangle Ave.,

Dayton, Ohio



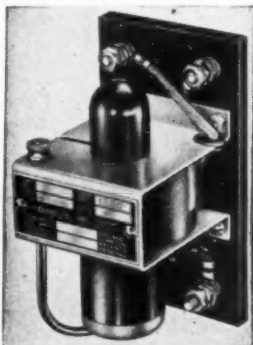
DEARBORN Automatic Chucking and Indexing Fixture MILLS OVER 1000 PARTS PER HOUR

Work held by draw in collets. Collets open and close automatically. Work automatically ejected. Indexes without loss of time for milling 1, 2, 3, 4, 6, 8, 12 or 24 sided pieces. Minimum set-up time required. Speeds up production. Positive and accurate in operation.

J. W. DEARBORN

72 S. CLIFF ST. ANSONIA, CONN.

the relay may be operated up to 300 times per minute, and that there is little friction and no wear. Rugged and simple construction eliminates risk of



breakage in shipment or operation. The relay requires no maintenance or attention. No glass is used in its construction. The durable metal body is specially treated to hold a gas at a pressure of 4 atmospheres—an important feature in the reduction of ionization between the contacts. Contact resistance is as low as .002 ohms. On A. C. current, as little as one watt is required for normal closing operation, and only 1.5 watts for normal opening operation. On D. C., the operating energy required is but 25 watts.

Manufactured to meet ordinary requirements, it is also available for special requirements up to 200 amperes' capacity. Also relay tube, or tube and solenoid may be ordered separately. For full details, write Durakool, Inc., Elkhart, Ind.



Why Not Buy The Original Electric Etcher? **MARK IRON AND STEEL** THE ETCHOGRAPH WAY

New ELKONITE TIP pencil.
New Baby Grand Model at a lower price.

2,000
in use

WILLIAM BREWSTER & CO., INC.
42 Church St., New York, N. Y.



Atlas

The Economical
Set-up for Tool Room
and Small Part Production

F-SERIES 10" LATHE

With instantly reversible power cross feed, complete V-belt drive, precision ground bed ways, custom-bored spindle bearings, backgeared power and many other modern features, Atlas F-Series Lathes are setting records in thousands of shops for cutting costs and speeding up production.

SPECIFICATIONS: Swing over Bed 10"; over Carriage 6 3/4"; 16 Spindle Speeds between 28 and 2072 RPM; Thread Cutting Range, right and left, 4 to 96 per inch (standard); Four Bed Lengths Available, Capacity 18" to 36" between Centers.

DRILL PRESSES

Production costs on sensitive drilling and tapping operations have been cut as much as 60% with Atlas drill presses.



7" SHAPER

Precision, power, and extreme versatility have been built into this compact shaper. Bull gear drive. 4 speeds. 5 reversible surface feeds. Runs from 1/2 h.p. motor.



ATLAS PRESS CO.

550 N. Pitcher St., Kalamazoo, Mich.

NEW YORK—130 W. 42nd St.

CHICAGO—35 E. Wacker at Wabash

PHILADELPHIA—113 N. Third St.

The new 1940 Catalog of Atlas Shop Equipment contains many outstanding machine tool values—metal lathes, drill presses, shapers, arbor presses, vices, motors, grinders, tools and attachments. Send for your free copy today.



HERE'S A REAL DRILL VISE

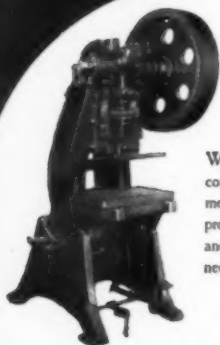
Shar-Grip Jaws 5-in. wide, hardened, reversible; open 5-in. Hold round, square and odd shapes—usable three ways. Satisfaction guaranteed—price, only **\$12.50**.

Write for folder and full information

JOHNSON TOOL CO., INC.

65 Mansfield Ave.,

East Providence, R. I.

**RECLINABLE
POWER PRESSES**

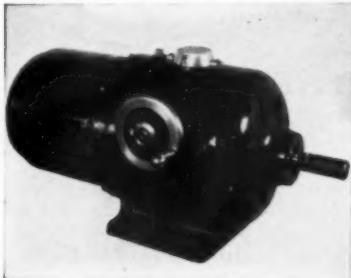
We manufacture a complete line of mechanical power presses, with sizes and types for every need in your shop.

Write for
bulletins.

ZEH & HAHNEMANN CO.
Newark, New Jersey

Lenney Redesigns Transmission

Extensively redesigned is this infinitely variable speed transmission, manufactured by the Lenney Machine & Mfg Co., 733 Niles Road, Warren, Ohio. It has a speed range of 225 to 925 r.p.m., when driven by a 1750 r.p.m. motor, an automatic pressure regulating clutch of simple and rugged design; is actuated by the amount of load at the output shaft, which positively prevents slipping. The objectionable feature of bevel gears is said to have been eliminated, thereby adding to the quietness and reducing vibration. The design has been so changed as to eliminate practically all thrust in cross shaft and bearings. Speed indicator dial conveniently located on the top of the machine allows the operator to select the speeds accurately. Precision ball bearings are used throughout. Oil is sealed within the case and



thorough lubrication is insured by the splash method. The output end cover has also been redesigned to conform to the streamline trend.

**GOOD NEWS!**
for DIE MAKERS

**Transfer Points Eliminate
Guesswork in Die Making**

There's no chance for error when you use transfer screws as markers in setting dies. Points are of uniform height above hex base. Six accurately made and hardened screws nest in a special holder with hex wrench tip. Made in $\frac{1}{4}$ " to 1" diameters.

3/16"	\$1.50 per set	5/16"	\$1.25 per set	7/16"	\$1.40 per set
1/4"	1.20 " "	3/8"	1.35 " "	1/2"	1.50 " "

HEIMANN MFG. CO.,

URBANA, OHIO

Landmaco Shell Tapping

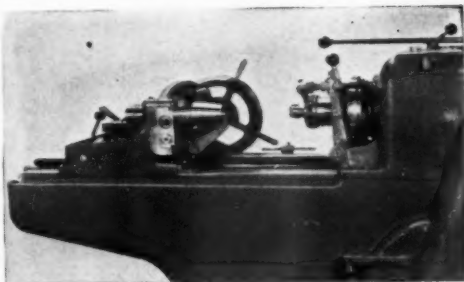
The Landmaco threading machine is designed primarily for cutting external threads; whereas, in this new application, the machine is equipped with a Landis Style "ALT" collapsible tap to permit cutting of internal threads on the fuse plug end of shells. While the illustration shows a 75 m/m shell, the machine will handle other sizes.

In addition to substituting the collapsible tap for the usual Lanco Head, special accessories include a gauge arm, special round grips, and a work supporting cradle.

In operation, work is laid on the cradle and is then pushed forward through the grips to the stop. The ground surface of the cradle prevents marring of work. The grips are then closed and the lead screw engaged. When predetermined thread length has been cut, the tap automatically collapses, and work can be withdrawn.

This arrangement permits tapping of shell threads well within the specifications for work of this type. Because of the high threading speed which can be employed, production is said to be 300 to 400% higher than by methods previously used.

Flexibility of the arrangement is emphasized by the fact that one foreign country was also interested in machining the chamfer at end of shell which forms the seating surface for the fuse plug. A set of milling cutters



was incorporated into the tap, back of the regular chasers, to mill this surface. With this arrangement, the shell is run up against the milling cutters, the tap being in the collapsed position. After the surface is milled, the work is withdrawn, and the tap expanded.

Address Landis Machine Co., Waynesboro, Pa., for additional details.

NIELSEN Heavy Duty *Live Centers*

*Write for
catalog on
live centers*

Adapted
for heavy
duty work.
Precision type
ball and roller
bearings assure
maximum capac-
ity for high speed
production and long
service.

NIELSEN, INC. LAWTON, MICH.

PYRO THE SIMPLIFIED OPTICAL PYROMETER



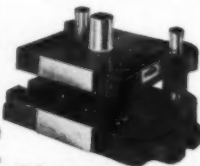
Unique construction enables operators to rapidly determine temperature even on minute spots, fast moving objects or the smallest streams; no correction charts, no accessories, no upkeep.

THE PYROMETER INSTRUMENT CO.
102-105 Lafayette St., New York, N. Y.

DANLY DIE SETS

Precision
Commercial
Special

Danly Machine
Specialties Inc.
2130 S. 52 Avenue Chicago



DANLY DIE MAKERS'
SUPPLIES

DON'T DISCARD IT

Effect a 30% to 75% saving in tool costs, by having your worn-out or obsolete tools made over by RENU — and guaranteed as good as new, both for appearance and performance.

RENU TOOL CO. • 275 E. Milwaukee • DETROIT

Renu
IT!



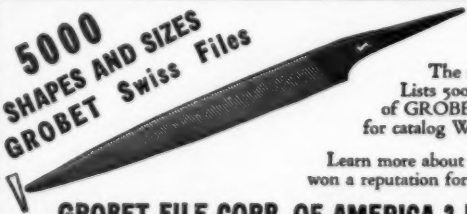
Matthews Develops Airless Painting Machine

Jas. H. Matthews & Co., 480 Canal St., New York, N. Y., announce a new airless electric hand painting machine for inside or outside work. It is protected by U. S. and Canadian patents—is claimed to be five times faster than brush application—and to effect a 25% saving in total painting cost.



The machine is exceedingly compact and self-contained. In operation, the paint feeds from the container into the machine by vacuum. It is then pumped by worm to the distributor. Here, by centrifugal action the paint is subdivided into uniform particle size and distributed to the surface being covered in a graduated film. This permits the

**5000
SHAPES AND SIZES
GROBET Swiss Files**



Ask for Catalog WF.

The most complete catalog of its kind. Lists 5000 different shapes, sizes and cuts of GROBET Precision Swiss Files. Ask also for catalog WM on files for filing machines.

Learn more about these Chrome Steel Files that have won a reputation for utmost precision and durability.

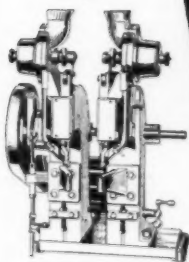
GROBET FILE CORP. OF AMERICA 3 Park Pl., New York, N. Y.

FLEXIBILITY

MULTIPLE RIVET SETTERS WITH ADJUSTABLE CENTERS

Even your small-lot production problems can now be solved by real production methods. Chicago Multiple Setters can be adjusted to set two tubular rivets at a time on centers from $\frac{1}{16}$ " to 12". Double setting and great flexibility have been combined to make a machine that brings economy to manufacturers large and small. Bench and pedestal models are available for light or heavy duty work.

Rivets are fed, inserted and clinched at a single stroke. One head may be locked, if desired, using the other for single-setting. Chicago machines are safe and speedy. wherever strength and perfect finish are demanded. Send a blueprint or sample assembly for a free assembly and production analysis.



Model 55 Automatic Double Setter, Bench Type, will set two $\frac{1}{8}$ " tubular rivets at a time.

Chicago RIVET & MACHINE CO.
1855 So. 54th Ave. (Cicero P. O.) Chicago, Ill.

TUBULAR & SPLIT RIVETS IN ALL RIVET METALS



HANDY RACKS SAVE TIME and MONEY

Tremendous capacity between the knees and shoulders of a man's height and in small floor space. No stooping, stretching or back-breaking. Very valuable in connection with supplying stock to automatic screw or parts-machines.

30 days approval if you wish.

Write today for details.

Wm. S. Yohe Supply Co.
593 Mahoning Rd. N. E., Canton, O.

Shear Cut END MILLS

You **Save Time, Trouble and Money** by specifying **PROGRESSIVE Shear-Cut End Mills**. They cut faster, easier and leave the smooth finish you want.

Write **TODAY** for catalog and prices on the complete **PROGRESSIVE Line**

PROGRESSIVE TOOL & CUTTER CO.

2346 WOLCOTT ST. • FERRISDALE, MICH.

operator to overlap his strokes and assures even applications of paint. One application with the machine is said to be equal to two or more coats of brush painting. Paint is not subjected to air until after it is applied to a surface—consequently, there is no fog and no mist. Droppage is said not to exceed that of the most careful brush painting.

The machine is recommended for inside or outside painting of factories, stores, houses, office buildings, apartments, etc. For industrial coating, waterproofing, stenciling, etc. of large areas. For display builders, window and store decorators, sign builders, contractors, builders, etc. An eight page bulletin gives full information.

Proper Care of Safety Goggles

For maximum results from safety goggles, they should first be worn and, secondarily, kept in perfect order. Out of its long experience in the industrial field, the American Optical Co., Southbridge, Mass., has evolved a set of simple rules on the care of safety goggles. These instructions, if followed, should assist in reducing goggle replacement and maintenance costs; at the same time, provide more efficient eye protection for workers. These rules have just been published by the optical concern in the form of an attractive, well-illustrated bulletin, copies of which will be mailed on request.

Featured in the bulletin are proper methods of sterilizing goggles to avoid face and eye infection; also, instructions on proper goggle adjustment to avoid discomfort and "loopholes" for injuries.

**GROBET
ROTARY FILES**
ground from the solid



Ask for Catalog WG

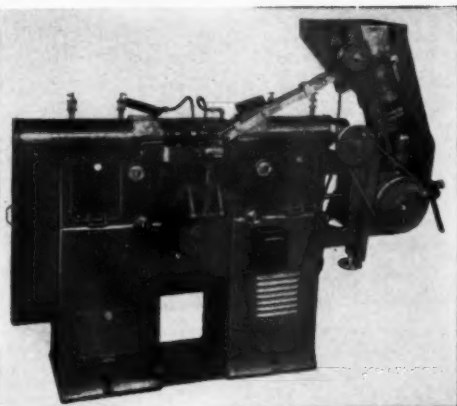
the most complete catalog of its kind, illustrating hundreds of rotary files hand cut, milled cut, ground from the solid; also diesinkers' burs.

GROBET FILE CORP. OF AMERICA 3 Park Pl., New York, N.Y.

Kent Duplex Drilling Machine

The Kent Machine Co., Cuyahoga Falls, Ohio, offers a new type horizontal duplex spindle drilling machine. While designed primarily for drilling cotter pin holes in screws, bolts, etc., either through head or shank, yet it is applicable to a variety of drilling problems of a similar nature.

Drills enter opposite sides of the work simultaneously, and proceed to a point near center of piece where one drill is withdrawn and the other follows through, completing the hole. Work to be drilled is rigidly held between two grip jaws carrying drill bushings which centralize work, guiding the drills



Drilling speed of spindle, feed of drill, and depth of cut can be varied independently; the former by four step cone pulleys for single V belt drive, and the latter by change gears and adjustable link mechanisms from cams to the reciprocating control of the drill spindle sleeves. Access to linkage adjustment is through two doors at front of machine. A single motor is located within base of machine with independent drives to each drilling spindle, with worm gear drive to control drill feed and operate grip jaws.

The main drive shaft within base, carries a sprocket for driving cutting lubricant pump which is located over a sump in base of the machine. Coolant is piped to drill bushing holders.

Machine can be furnished with a semi-automatic or fully automatic work feeder. The one shown is fully automatic including a hopper, galley from hopper to transfer mechanism, and the transfer mechanism which carries work from galley to the grip jaws. The hopper may be eliminated and work fed into a short galley from which it is taken to the grip jaws by the transfer mechanism. Or, all of the automatic feed attachments may be eliminated, feeding the work by hand to

the grip jaws.

The machine drills screw up to 9/16", either in diameter of shank or across flats of head. Drill capacity is 1/4" diameter.

— GEARS —

**Spur—Helical—Worm—
Bevel—Miter, Etc.**

We do broaching and all kinds of grinding.

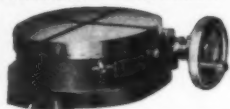
We specialize in grinding hardened steel bushings, cam rollers, etc.

Prompt service and quality has retained a large list of customers for 25 years.

TAYLOR MACHINE CO.

1919 E. 61st St.,

Cleveland, Ohio

TROYKE ROTARY TABLES

**Moderately
Priced**

Made in 9", 12", 15", 18", 21", 25".
With or without dividing plates.

Ask your dealer or write us for complete catalog.

ALFRED A. TROYKE

221 E. Second St. Cincinnati, Ohio

KNOCK-OUT Reamer and Cutter
Grinder

*Here is one machine that is still within
the range of your pocketbook*



Grinding a Hollow Mill Cutter

A machine in a class by itself

With this Universal Tool you can do any tool grinding job within its range, including Carboloy tools, at a big saving in time.

Ask for bulletin No. TG405H.

K. O. LEE & SON CO.

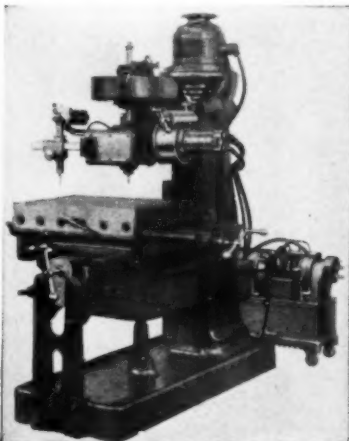
Aberdeen, So. Dak.

"practical tools for practical men"

KNOCK-OUT

Detroit Universal Duplicator

Higher accuracy and faster production in duplicating dies, molds, etc., are among the claims for a new low cost duplicating control and drive mechanism announced by Detroit Universal Duplicator Co., 229 St. Aubin St., Detroit, Michigan.



Sensitivity of control necessary for such work is said to be provided through a new auxiliary drive and an improved design of duplicator, including a "superimposed" impulse mechanism.

Developing the head feed control as an independent unit, the duplicator proper becomes a universal unit interchangeably applicable to lathes, planers, boring mills, etc. The control is so designed that it does not interfere with the use of a milling machine when the duplicating function is not required.

The drive comprises an hydraulic motor mounted on the milling machine head, to which is connected the down feed through 300:1 reduction gearing. Two flexible hydraulic cables supply fluid from the duplicator unit for operation. A hand crank provides for manual movement of the head down feed when setting up work.

TURNER GEAR BOX DRIVE

**for BROWN and SHARPE
AUTOMATIC SCREW MACHINES**

This drive can be furnished for sizes 00, 0 and 2—both standard and high-speed types (six sizes in all.) Very compact, quiet and efficient individual drive. Six speed silent sliding gear transmission built especially for Brown & Sharpe Screw Machines. Quick change of pulleys gives unlimited speed range. Anti-friction bearings throughout. All-steel, heat-treated gears running in oil. Can be installed without drilling in one hour.

Built for lathes, shapers, radial drills, turret lathes, vertical mills, etc.

**PATENTS
PENDING**

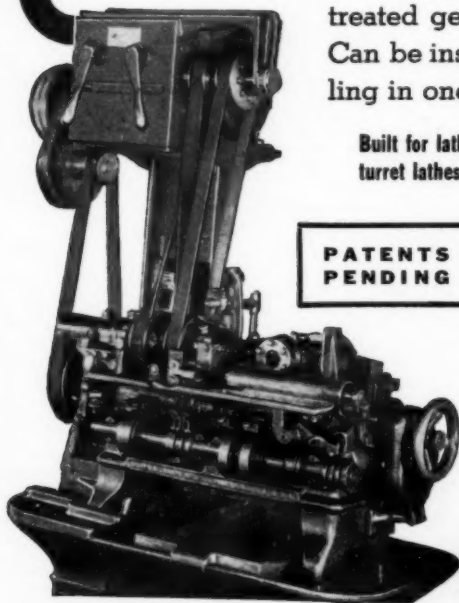
DEALERS

Write for prices and literature!

USERS

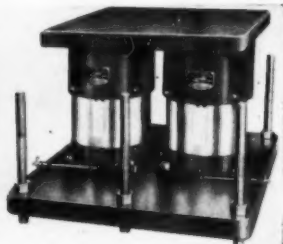
See your dealer or write for full facts!

**THE TURNER
UNI-DRIVE CO.**
1638 Central St.,
Kansas City, Mo.



Rogers Pneumatic Die Cushion

The Dayton Rogers Mfg. Co., 2830 S. 13th Ave., Minneapolis, Minn. announces a new design of pneumatic die cushion, made in four sizes—known as their Model H. This general utility telescoping die cushion is well adapted to all press applications, including inclinables and straight sides. It may be used singly or in multiples. Multiples are used in two, four and six units, and mounting plates are made special to fit the given press requirements.



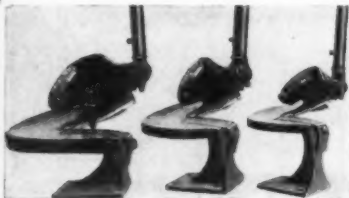
makes them well adaptable to all kinds of work requiring balanced pressure on the draw ring.

The telescoping cylinders permit mounting this type of cushion on a given press without providing a pit for same. Accurate guidance of the pin pressure pad, so essential on most classes of work, is said to be easily obtained by this type of cushion, which

Each cushion is complete with regulator and gauge, surge tank, and all other necessary equipment, ready to install. When cushions are not needed, as for blanking and piercing work, and when the cushion is not under air pressure, the cylinder may be bled, allowing the pin plate to drop down or retreat to the bottom of the maximum drawing capacity—thus allowing blanks and slugs to drop through the free opening in the bolster plate. If used on an inclinable press, they will automatically drop off the pin pressure pad into receivers below the press.

This cushion should fill a long felt want where extremely heavy ring holding pressures are wanted in a limited space beneath the press bed proper.

Do You Need Heavy Duty Bench Shears?



Model 3 Model 2 Model 1

Three sizes of BEVERLY SHEARS offer you modern shearing performance.

Model B-1 weighs 16½ lbs.—cuts stock up to 14 gauge.

B-2 weighs 32 lbs.—handles up to 10 gauge.

B-3 weighs 55 lbs.—takes up to 3/16" mild or 10 gauge stainless steel.

Reasonably priced—send for descriptive circular

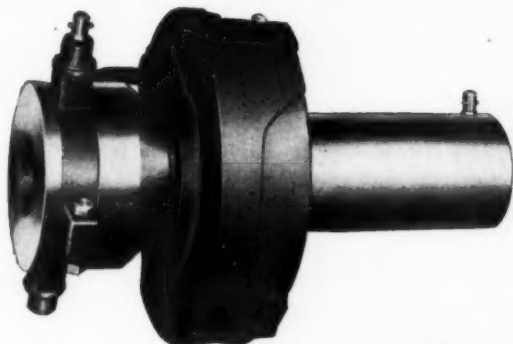
THE BEVERLY SHEAR CO.

3007 W. 110TH PLACE, CHICAGO, ILL.

Light Bevel Safety Stamps

M. E. Cunningham Co., 115 East Carson St., Pittsburgh, Pa. announce new, light bevel stamps which are claimed to prevent accidents from mushrooming and spalling. Due to the new alloy steel used, it is possible to produce stamps with the strength of ordinary heavy bevel stamps while at the same time being 35% lighter. This lightness makes the light bevel safety stamp easier to handle, and in stamping finished surfaces, a far greater degree of accuracy said to be possible.

CONWAY PATENTED COMPRESSION CLUTCH



Strong—Simple—Efficient

Simple, easy mounting; adjustment merely taking up on a nut; friction band wraps in complete peripheral contact about the drum, and when Clutch is released the band springs back into a machined guide which holds it concentric with the bore providing clearance between the friction surfaces when the Clutch is idle; engagement so easy it could be operated with the thumb; drag-free idling, instant release.

These efficiency operating features, plus husky construction and interchangeable parts, make for completely satisfactory Clutch service.

Send for details—ask Conway engineers for special data to help you find the *right* Clutch. Have you Bulletin No. 36A on Compression Clutches, P-24 L-28 and XYZ-L on Disc Clutches, S-10 on Overload Release and Slip Clutches, K-32 on one-Revolution Clutches, E-8 on Expansion Clutches?

PATENTED IN U. S. A. AND CANADA

THE CONWAY CLUTCH CO.

Also manufacturers of the Splendid Conway Disc Clutch
1541 Queen City Ave., Cincinnati, Ohio



REPAIR CONCRETE to a TOUGH Feather Edge!

RUGGEDWEAR RESURFACER, made with cellulose, may be used for patching concrete or over an entire area . . . indoors or out. Stands up under the heaviest floor traffic. No chopping or chipping required. Merely sweep out the spot to be repaired—mix the material—trowel it on. Holds solid and tight right up to the irregular edge of the old concrete . . . leaves no joint or crevice to become chipped or filled with dirt. Provides a firmer, tougher, smoother, more rugged wearing surface. Dries fast. Costs only 10c

to 14c per square foot. **RUGGEDWEAR** is the only Resurfacer made with cellulose. Valuable, 60 page **"HANDBOOK of BUILDING MAINTENANCE"** sent **FREE** to those requesting on business letterhead.



MAKE THIS TEST!

FLEXROCK COMPANY
2305 Manning St.
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Please send me complete **RUGGEDWEAR** information . . . details of **FREE TRIAL OFFER**—no obligation.

Name

Company

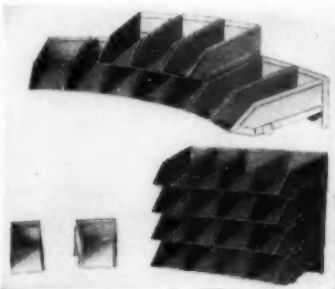
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City State

Assembly Bin for Larger Parts

Stackbin announces a new size assembly bin of larger size.

It is 12" long, 4" deep, 5" wide in front and 6" wide in back to accommodate larger parts than formerly possible. As in the former style, contents are fed toward front by a sloping floor, but an additional



advantage is space enough to allow entrance of the hand.

These bins can be used on any assembly bench—can be set up in a semi-circle and stacked one above the other to keep all important parts constantly accessible. They are made of heavy gauge sheet steel with welded construction throughout for durability and long life. Patents have been applied for.

For full details on these and other Stackbin products, write Stackbin Corp., Providence, R. I.



MODERNIZE present equipment with a **RUSSELL BORING BAR**. Bores 9/16" to 12" dia. with boring axis parallel to shank axis. One compact tool, with micrometer adjustment.

RUSSELL BORING BAR CO.
MIDDLETOWN, OHIO

REPLACE OLD SHAFTS WITH A GENUINE

QUALITY GUARANTEED!



WYCO "ARMORED"
FLEXIBLE SHAFT

with Patented **NON-METALLIC** Inner-Liner

**PRICES ON STANDARD WYCO FLEXIBLE SHAFTS COMPLETE
WITH BALL BEARING HANDPIECE AND MOTOR COUPLING**

No. 0—WYCO "Junior" Flexible Shaft, 4' long, 5/16" diameter core.....	\$ 7.50
No. 01—WYCO "Junior" Flexible Shaft, 5' long, 3/8" diameter core.....	10.50
No. 1—1/4 H. P. WYCO Flexible Shaft, 4' long, 3/8" diameter core.....	15.00
No. 10—1/3 H. P. WYCO Flexible Shaft, 5' long, 3/8" diameter core.....	17.50
No. 02—1/2 H. P. WYCO Flexible Shaft, 5' long, 7/16" diameter core.....	22.50
No. 2—1/2 H. P. WYCO Flexible Shaft, 6' long, 7/16" diameter core.....	25.00
No. 20—1/2 H. P. WYCO Flexible Shaft, 7' long, 7/16" diameter core.....	27.50
No. 3—3/4 H. P. WYCO Flexible Shaft, 6' long, 1/2" diameter core.....	30.00
No. 30—3/4 H. P. WYCO Flexible Shaft, 7' long, 1/2" diameter core.....	33.00
No. 4—1 H. P. WYCO Flexible Shaft, 7' long, 5/8" diameter core.....	40.00
No. 5—2 H. P. WYCO Flexible Shaft, 7' long, 3/4" diameter core.....	48.00

PRICES ON SPECIAL HIGH SPEED PRECISION WYCO SHAFTS FOR SPEEDS OVER 3600 RPM

No. 00-P—Precision WYCO Flexible Shaft with 1/4" col. handpiece 4' long, 1/4" dia. core	\$16.50
No. 10-P—Precision WYCO Flexible Shaft with 1/4" col. handpiece 5' long, 3/8" dia. core	27.00
No. 2-P—Precision WYCO Flexible Shaft with 1/4" col. handpiece 6' long, 7/16" dia. core	35.50
No. 33-P—Precision WYCO Flexible Shaft for No. 33 Machine 6' long, 1/2" diameter core	37.50
No. 43-P—Precision WYCO Flexible Shaft for No. 43 Machine 7' long, 3/4" diameter core	48.00

(All prices listed above include Ball Bearing Motor Couplings)

Write for our new 28 page catalog listing our entire line of
"Quality Guaranteed" Flexible Shafts and Machines.

WYZENBEEK & STAFF, INC.

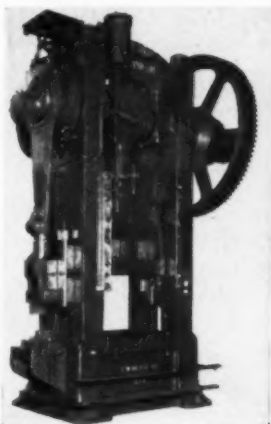
838 W. HUBBARD ST., CHICAGO, ILL.

Bliss Heavy Duty Trimming Press

The E. W. Bliss Co., 53rd St. and Second Ave., Brooklyn, N. Y., announce to the trade a new line of trimming presses for the forge shop and kindred industries. This "Bliss" No. 209-1/2-A straight-sided single crank press is one of many presses in this new "Bliss" line. Rugged, yet incorporating modern design and harmonious proportions, these presses are well calculated to stand up to the high production requirements and hard usage of the forge shop. They are equipped with outside slide or cut-off attachment for cutting the flash from bars, punching holes and trimming.

It is of tie rod construction with the steel tension rods shrunk-in at 100% over the press rating, and with beam and compression members cast from modern irons of good tensile strength, high compression strength and hardness, and with good shock absorbing properties.

The old split clamping action in the connections, it is emphasized, has been



supplanted by solid straps with a cross grip action assuring positive holding with greatly increased strength.

Other features include: — the fast



RED HEAD

ETCHERS and DEMAGNETIZERS

Let us tell you the many advantages of our new D. C. and A. C. models now available. Also, see our new line of Magnetic Parallels and Midget Chucks.

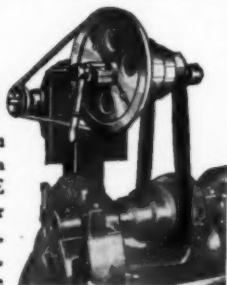
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PRINTZ ELECTRIC CO.

14595 KENTUCKY AVE.,
DETROIT, MICHIGAN

GUARANTEED FOR 5 YEARS

When you purchase a **STEEGE Drive** for your lathe, shaper, miller, etc., you're



protected by our broad 5-year guarantee.

STEEGE Drives are easily installed—prices \$35.00 up—sent on 30 days' approval. *Let us send catalog.*

W. L. STEEGE MACHINERY CO.

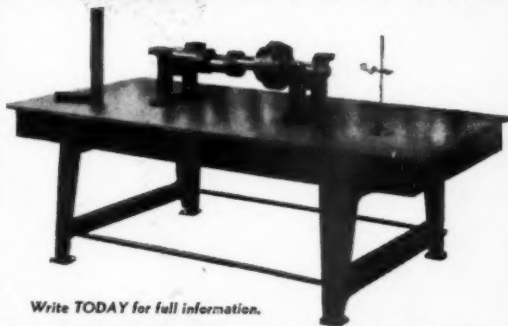
(Our 23rd Year)
548 W. Monroe St., Chicago, Ill.

Useful in any Modern Shop

48"x96" MILWAUKEE SURFACE PLATE

Rugged, semi-steel construction accurately machined—provided with cross ribs every 13" for rigidity—securely mounted on cast legs which are machined and provided with SAE adjusting screws for perfect alignment. Height from floor to top of plate 33". Shipping wt. 3300 lbs.

We also make planed and scraped surface plates of various sizes.



Write TODAY for full information.

J. C. BUSCH COMPANY

E. Pittsburgh Ave. and So. Ferry St.,

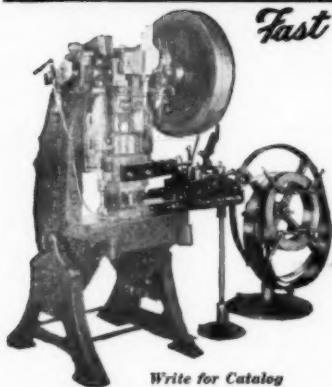
ENGINEERS AND MACHINISTS
SINCE 1907

MILWAUKEE, WIS.

WITTEK ROLL FEEDS

FOR ANY MAKE AND SIZE OF PUNCH PRESS

Fast Safe Accurate Automatic



Write for Catalog

Keep up with production schedules, yet keep costs down by installing Wittek Automatic Roll Feeds—the feeds that have made automatic punch press operation practical on even comparatively short runs.

They can be installed on any make or size punch press without alterations . . . will handle any coiled stock and feed from right to left, left to right, back to front or front to back in any length from 0" to 24" per press stroke at catalog speed or faster.

Improved Operating Principle

Improved, simplified method of operation insures rapid smooth, accurate feeding. Made in 3 types, Wittek feeds save dies, reduce scrap and cut maintenance costs to a minimum.

WITTEK ADJUSTABLE REEL STAND

6 types—a type for every job. Will handle any stock (metal, foil, paper, etc.) Wittek No. 3 (illustrated) has automatically expanding coil holders that center the coil and assure maximum production by eliminating looping, tangling and backlash of stock.

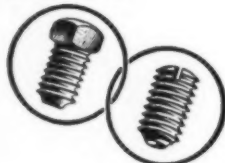


WITTEK MFG. COMPANY
4305 W. 24th Pl. Chicago, U.S.A.

and reliable rolling key clutch, made of properly hardened alloy steels; V-belt motor drive; extra wide bed and slide and air counterbalance for the slide. A floor line lubrication system is furnished which reaches the main bearings and other points via pressure fittings that are within reach of the man on the floor.

The machine shown is single geared and operates at 25 strokes per minute. The press weighs approximately 57,500 lbs.

MOORE'S



SMALL SET SCREWS

Headless to 1/2 - 13 —
Square Heads to
3/8 - 16 and Dardelet

Our table, "Number of Linear Feet to Make 100 Pieces," sent on request.

GEORGE W. MOORE

44 Farnsworth St., Boston, Mass.

For 60 Years Mfrs. of Quality Screws

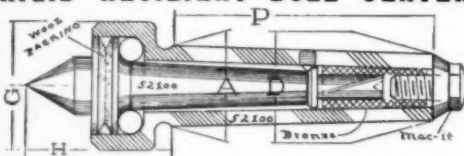
Larger Randall Pillow-Blocks

Meeting demands for the one-piece steel housing pillow block for shafts of 1-1/16" to 1-5/16" diameters, Randall Graphite Products Corp., 609 W. Lake St., Chicago, announces a new, larger pillow block of this type. The



patented design results in a quiet, lightweight, low priced bearing that is simple yet sturdy. It is said the new bearing will effect a considerable saving in original, assembly, and shipping costs. Features reported for the unit include:—quiet operation, selective mounting positions, constant self-alignment, self-lubrication, and 1/3 less weight. The entire assembly, consisting of only three parts—the one-piece steel housing, a new machined cast iron ball with large oil reservoir, and a patented bronze bushing with graphite filled grooves to provide ample lubrication, is attractively cadmium plated to resist corrosion, and is assembled, ready for use without adjustment.

RIGID RESILIENT BULL CENTER



Rigid Tool Holder Co., 2,000 Witherell St.,
Detroit, Michigan

A disappointed buyer is slow in paying for his disappointment; while we have never yet, lost a dollar, on a purchase order; or a customer that we know of; and seldom send out a "Please remit". But we are real cranky, about good work, and good material. The best is none too good. Excellence in Designing and Manufacturing is Excellence in Advertising.

All Morse tapers carried
in stock.

G. E. Sump-Pump Float-Switch

A new float-switch designed specifically for sump-pump control is announced by the General Electric Co., Schenectady, N. Y.

It is a single-pole switch employing an overcenter toggle mechanism. Float-rodweight is counterbalanced by a calibrated spring acting on the operating lever.

Other features include corrosion-re-

sistant parts in the mechanism which permit operation under severe moisture conditions; accessible terminals for easy wiring; a dummy terminal to provide convenient wiring of the "through" side of the line; fine-silver contact tips, and snap-action mechanism. This new control simplifies the design of the sump pump because of the fact that it is actually built for mounting in the motor endshield or some suitable part of the pump.

Does Your Small Press Have These BIG SAFETY FEATURES?

SAFETY AUTOMATIC KNOCKOUT BAR NON-REPEATING CLUTCH

In the past, only larger punch presses have been provided with an Automatic Knockout Bar. Now, on the Rousselle, this improved device provides added protection and increased efficiency in production.

As the die raises and clears the work, the Automatic Knockout Bar quickly removes the completed stamping from the die, clearing the way for the next piece.

Another Rousselle safety feature is the Non-Repeating Clutch. This Clutch stops the press at each stroke regardless of the position of the foot pedal. It is simply constructed, strong, compact and easily accessible. High production is assured. With automatic feed, up to 10,000 operations per hour are possible.

Reduce your initial investment, save money, and still get the advantages formerly found only in big presses.

Send for our new Bulletin giving full details.



DAVID J. ROSS COMPANY
BENTON HARBOR, - - MICHIGAN



SAVINGS START IN TWO MINUTES

That's all the time it takes to hang up and plug in a "Budgit" Hoist. Then it's ready to use and all the advantages of electric lifting are yours . . . "Budgits" speed the work, promote efficiency, reduce waiting time of men and machines 20 to 40% and more . . . **THEY EARN THEIR LOW COST OVER AND OVER AGAIN OUT OF SAVINGS.**

"Budgit" Hoists come in 250, 500, 1000, and 2000 pounds lifting capacity with speeds to suit today's tempo . . . All weigh so little you can move them from job to job. You can afford "Budgits"! Prices start at \$119. Nothing else to buy before you use them. You simply Hang Up, Plug into the nearest electric socket, and Use!

Send for catalog containing complete information, also "Time Savings Calculator" that shows savings they earn.

SHAW-BOX CRANE & HOIST DIVISION

MANNING, MAXWELL & MOORE, INC.

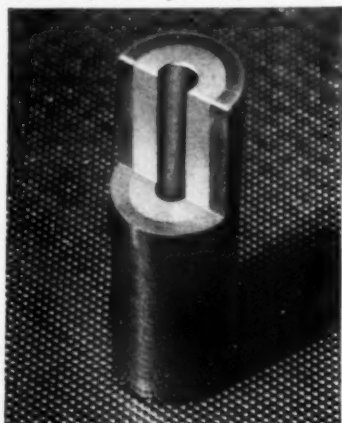
435 BROADWAY • MUSKEGON, MICHIGAN

Makers of all types and sizes of Electric and Hand-Operated Cranes and Electric Hoists . . . Send all your Crane and Hoist inquiries to Shaw-Box!

Portable Electric **BUDGIT** HOISTS

Kennametal Work Supports

Work rests for supporting work in machine tools and other metal working machinery are now supplied with Kennametal inserts by the McKenna Metals Co., 135 Lloyd Ave., Latrobe, Pa.



Because of the hardness of Kennametal (76 to 78 Rockwell "C"), work supports in which this material is used have long life and assure accurate positioning of work.

Kennametal work supports are made to specification in any practical length, diameter and bore. The illustration shows a cut out view of a typical one used to support a pinion in an automatic screw machine. In this instance, the work support is $1\frac{1}{2}$ " long with $\frac{1}{2}$ " outer diameter.

This represents the latest application of Kennametal in parts subject to unusual abrasive action or which must hold their accuracy for a long period of time. Such parts now include follow rests, lathe and grinder center nibs, oil well pump valves, drill tips for masonry, stone, etc., jig drill bushings, wire coiling tools, gas well "choke" valves, dies for pressing and forming abrasive ceramic materials, gauge and micrometer tips, and many other wear-resisting parts. The Company will gladly cooperate with interested manufacturers in adapting Kennametal for special applications.

Wear Goggles Under Helmets

Maximum eye protection at all times is assured for welders who wear safety goggles under their helmets, American Optical Co., Southbridge, Mass., declares, pointing out that when helmets are taken off or raised to do chipping or other close work the eyes are still protected.

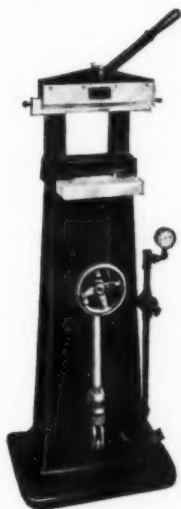
For additional protection, the Company emphasizes that the goggles should have side shields and also lenses that are scientifically compounded to

cut down glare, absorb heat, and resist the impact of flying particles.

Two of its goggles, the Company points out, were specifically developed bearing these factors in mind — the F-3149 Ful-Vue Goggle and the 3080 Goggle. The latter is especially serviceable for workers on or near electric welding operations, as protection against "flashes" which are potentially dangerous. Both goggles are fitted with Super Armorplate Calobar lenses, toughened and controlled for exact uniformity of absorptive properties

MARKED - IDENTIFIED

Permanently



MODEL 25

PART NUMBERS, CATALOG NUMBERS,
HEAT NUMBERS, SERIAL NUMBERS,
PATENT NUMBERS
MANUFACTURER—INSTRUCTION DATA—INSPECTION

Positive, Permanent MARKING ON YOUR PRODUCTS ASSIST PROSPECTS TO ORDER. MAKES IT EASIER TO BUY—NEW, REPEATS AND REPAIRS. GIVES YOU A DEFINITE RECORD OF PERTINENT DATA ON EACH PART PRODUCED.

The Pneumatic Marking Machine ILLUSTRATED IS OUR HI-DUTY MODEL 25 GENERAL PURPOSE TOOL FOR SHORT RUNS OR PRODUCTION WORK. IT OPERATES FROM YOUR SHOP AIR LINE AND IS ONE OF NUMEROUS MODELS BUILT TO PRODUCE NEAT, PERMANENT MARKINGS QUICKLY ON METAL FABRICATIONS.

WE WILL BE HAPPY TO MAKE SPECIFIC RECOMMENDATIONS UPON RECEIPT OF SAMPLES OR PRINTS OF PARTS TO BE MARKED, SHOWING APPROXIMATE LETTERING, ITS LOCATION ON THE PART, WITH REQUIRED HOURLY PRODUCTION.

**MARKED PARTS ADVERTISE
IN THE RIGHT PLACE, AT THE RIGHT TIME.**

*Unlike John Alden —
"They Speak For Themselves."*

GEO. T. SCHMIDT, Inc.

1802 Belle Plaine Ave., Chicago, Ill.
Builders of Marking Equipment Since 1895.

Send for complete
catalog of our full
line of marking
Tools, Machinery
and Equipment.

Comet Welder Models

A portable heavy duty engine-driven arc welder is announced by the Comet Products Co. Chappaqua, N. Y. The features stressed include:—self-excitation, self-stabilization, simple control, low operating and initial cost.

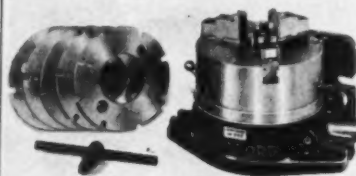
The makers assert that the heavy main commutator gives assurance of reliable excitation without the use of any external exciter parts. Also that the heavy duty construction permits relatively large size electrodes and high average amperages.

Simple control of current and voltage permits the operator to select quickly, the best combination to meet many varying conditions. Every combination of voltage and current values is said to be different. There are no duplicate settings, and adequate marking of the controls assures getting the heat required.



The welder is claimed to meet U. S. Navy requirements and is offered in four sizes: 150 and 200 amperes powered by the Wisconsin, four cylinder, air-cooled engine and 300 amperes powered by the water-cooled six cylinder Continental engine. All models are available at slightly higher prices with Waukesha "Hesselman" Diesel drives.

FOR MILLING, DRILLING, SLOTING, OR PLANING



FOR ONE PIECE— —OR FOR THOUSANDS

The HARTFORD "Super-Spacer" indexing fixture was designed to meet the demands of modern feeds and speeds. Its unequalled versatility fits it equally well for special work or for production jobs. Quick set-up—rapid, accurate indexing—elimination of error—greater rigidity—all these are yours in this new device.

Send today for complete information.

Hartford Special Machinery Co.
285 Homestead Ave., Hartford, Conn.

Goggle Protection for Those Who Wear Glasses

American Optical Co., Southbridge, Mass., points out that its No. 323 Duralite Coverglas goggles have been specially developed to provide dependable, comfortable protection for gas welders who must wear glasses for correction of vision. This goggle fits snugly over any style of spectacle, and protects the eyes from flying sparks and scale, light-rays and glare.

The goggle is light-weight, and fitted with Noviweld lenses, chemically compounded to protect against glare, invisible infra-red and ultra-violet rays that cause "hot sand in the eyes." Other features include improved ventilating louvers that keep eyes cool and lenses clear, yet exclude light; and specially shaped eye-cups made of a durable composition, strong and moisture-proof, and non-conductors of heat and electricity.

"Sheet Metal Work"

The American Technical Society, Chicago recently published "Sheet Metal Work," a comprehensive volume by William Neubecker, Instructor, Sheet Metal Dept. New York Trade School. This manual provides practical self-instruction in the art of sheet metal practices, designs and construction. In an interesting, clear style, the author discusses and illustrates pattern drafting and construction work in light and heavy gauge metal, including skylights, roofing, cornice work, and patterns for forced air fittings.

The book contains 360 pages, including more than 600 illustrations, sketches and photographs. It also contains a number of tables which any one working with sheet metal will find most valuable and will want to keep for permanent reference.

The sheet-metal draftsman has a very different problem in many respects than the mechanical draftsman who has to deal, in the main, with square or circular shapes. His surfaces are flat, spherical, or cylindrical and will be shaped by various machine tools.

The sheet-metal draftsman must have a deeper un-

derstanding of geometric principles, of the areas of surfaces, and many other matters not considered by the mechanical draftsman.

More complete information about this book, which sells for \$250 postpaid, may be obtained from the publisher, The American Technical Society, 58th and Drexel Blvd., Chicago. The book is attractively bound, very readable, and is printed on a heavy durable stock.

"Gone with the Wind"



REDUCE YOUR GRINDING COSTS with Modern Up-To-Date Grinders. A complete line—1 H. P. to 25 H. P.—for Vitritified and High-Speed Wheels—With Single or Variable Speeds.

DIRT CAN'T GET IN—Ask for BULLETIN No. 22 showing how we keep metal dust from the bearings and motor windings.

IF YOU USE POLISHING LATHES ask for BULLETIN No. 10 showing the World's most complete line of Polishing Lathes.

Hammond Machine Builders
INCORPORATED
KALAMAZOO, MICHIGAN, U.S.A.

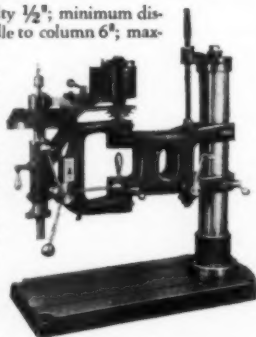
1614 DOUGLAS AVE.

Eastern Branch—71 W. 23rd St., New York City

AYER Sensitive Radial Drills

Drill capacity $\frac{1}{2}$ " ; minimum distance, spindle to column 6" ; maximum distance, $31\frac{1}{2}$ " ; minimum distance spindle nose to base 4" ; maximum 21" ; spindle travel 5" ; spindle bore Morse No. 2.

Complete with high grade geared $\frac{1}{2}$ " chuck.



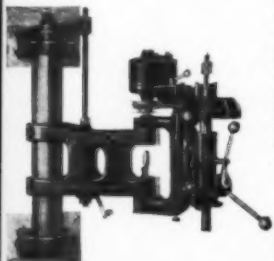
Bench or Wall Types

A sturdy dependable modern tool that gives you more for your money . . . in advanced mechanical features . . . in convenient, time-saving advantages . . . in quick and efficient performance.

Available in Bench or Wall Types. Spindle can be provided with taper, or motor equipped

with reverse switch. Motor bracket is located for larger or different makes of motors.

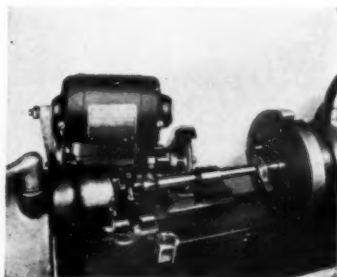
Write for full particulars. TODAY.



F. H. AYER MFG. CO.,
CHICAGO HEIGHTS, ILLINOIS

Dumore Attachment Saves Boring Tool

A Dumore thread grinder attachment for a No. 5 Grinder is said to have saved time and money for a mid-west tool shop in the production of a high-speed boring tool.



When the tool steel shaft was hardened and drawn, it was found that distortion, due to hardening, made it impossible to screw on the boring piece which required a precision fit. However, the shaft thread was easily re-ground with the Dumore attachment, saving the 6 hours work required to machine a new tool, representing a total saving of approximately \$15.00.

Machining this small piece did not warrant the large expenditure which would be entailed if a large thread grinder were set up to do the job. Delays resulting from sending the work out of the plant were avoided. Instead, the Dumore grinder was quickly converted into a thread grinder to handle the job.

BURR KEYSEATERS



Mill keyways in the run or on the ends of shafting already erected—save money on alteration, erection, and repair work.

Made in 4 sizes, for hand or motor operation.

Write for Bulletins and prices.

JOHN T. BURR & SON

429 Kent Ave.,

Brooklyn, N. Y.

Forerunners of Power Age

Three ancestors of the modern alternating current electric system, which has made possible the present-day age of power, drew national attention at the United States Patent Law Sesquicentennial exhibit in Washington's Commerce Department Auditorium.

Included among the basic patents assembled by 100 leading industrial companies for the observance of 150th anniversary of the signing of the First Patent Act were the original Gaulard and Gibbs transformer, the first induction motor, and the first induction meter. These venerable devices of electric power transmission, application and measurement were the forerunners of the modern developments produced by Westinghouse.

Long since retired from active work, these seemingly crude creations of wire, gears and iron are representative of the first practical achievements in the transmission and application of alternating current power over long distances from a central generating station.

The Gaulard and Gibbs transformer, no larger than a soap-box, was utilized by George Westinghouse as a basic principle in developing the alternating current system in America.

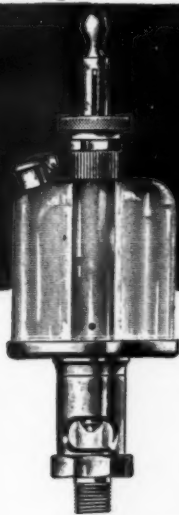
Development of the Induction motor is a classic ex-

ample of the joining of theory and application. Ferraris worked out the a.c. rotating field mathematically—Tesla simultaneously built an induction motor model which actually worked. U. S. basic patents were granted Tesla in 1888.

The same year, an accident hastened invention of the induction meter. Oliver B. Shallenberger saw a small spiral spring fall into the mechanism of an arc lamp. The spring began to rotate. Within a month he had invented the ampere-hour meter.

OIL when
and as you
need it!

GITS
unbreakable
SIGHT GRAVITY
NEEDLE VALVE
ADJUSTMENT
FEED OILER



Oil flow may be adjusted as desired, or completely shut off by adjustable needle valve. Modern, streamline, unbreakable bottle eliminates danger of broken glass in production.

Complete details on request.

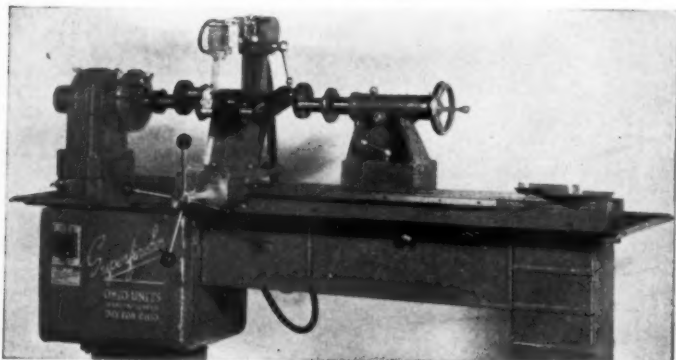
GITS BROS. MFG. CO.

29 years of oil cup experience

1860 South Kilbourn Ave.

Chicago, Ill.

Ohio Units N-301 Superfinisher



A new universal Superfinisher has been developed by Ohio Units, 515 Hunter Ave., Dayton, O. While intended for general use in automotive and tool shops, it should be exceedingly useful wherever high quality parts are

to be produced in less than production quantities.

The oscillating head, carrying the superfinishing stones is mounted on a carriage that may be manually traversed to permit stones to come in con-

3 Reasons You Can Depend On Mac-its To Cut Costs

- 1.** All standard diameters of socket screws are milled from electric furnace steel held to 5-point carbon range.
- 2.** Each Mac-it is heat-treated especially for the particular kind of service it will encounter.
- 3.** Perpetual process testing at the machines, plus modern, laboratory testing insure uniformity, durability, and fit.

Write for catalog and prices

THE STRONG, CARLISLE & HAMMOND COMPANY
1392 West Third St., Cleveland · Ohio

**Notably reduces
power loss . . .**

**(T-J) HYDRAULIC CYLINDER
PISTONS are SEALED
with PACKINGS**

On test these cylinders show a 95% average efficiency for pressures from 500 to 2000 pounds per square inch. The packings eliminate slippage and provide as nearly as possible the theoretical exerted power.

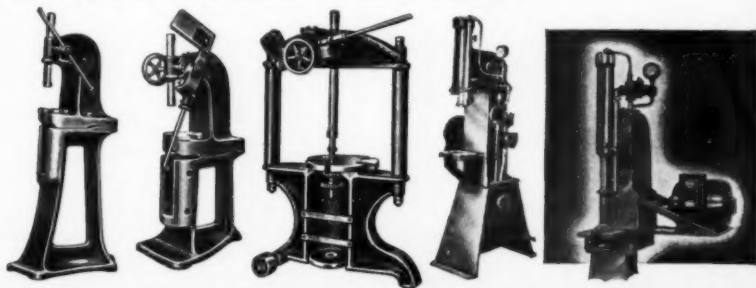


Catalog H-37 reports on additional construction features and complete cylinder specifications. Your copy will be sent promptly. Address The Tomkins-Johnson Co., 605 N. Mechanic St., Jackson, Mich.

this is a **TOMKINS-JOHNSON** *product*

BROACH and ASSEMBLE

65 standard styles and sizes—manually operated presses from $\frac{1}{4}$ to 35 tons pressure—motor driven hydraulic presses from $1\frac{1}{2}$ to 15 tons pressure. Write for catalog F.



GREENERD ARBOR PRESSES

NASHUA

Est. 1883

NEW HAMPSHIRE

**NO TANG • NO TAPER
REQUIRED ON DRILLS
IN THE NEW UNIVERSAL
ADJUSTABLE DEPTH**

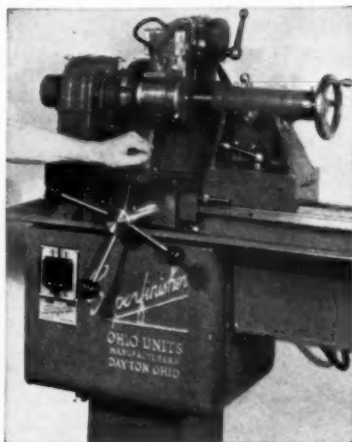
*Collet
Chucks*



UNIVERSAL

**Engineering Company
Frankenmuth, Mich.**

tact with the full length of the work. The head may be adjusted quickly to any position required, depending on size of work, and is driven by a flexible shaft from the main driving motor. Pressure of stones against the



work is controlled by a spring device, instantly adjustable to the tension required.

A gear pump with a maximum capacity of $1\frac{1}{2}$ gallons per minute, is base. Driven by motor which provides power for entire machine, it delivers a steady stream of lubricant to the work. An internal relief valve provides easy adjustment of flow. Fittings are provided for connections to various stone holders.

Capacity is 14" swing over bed 11-5/16" swing over carriage. Raising block is also available for head and tail stocks, increasing these capacities to 17-7/8" swing over bed and 15 1/2" swing over carriage. Tail stock center travel is 4-3/8". Maximum length between centers is 49"—or 63" on special order.

As shown, crankshafts are superfinished between centers by interposing an extra member in the oscillating head which follows the throws as the shaft

revolves. A single setup will handle main bearings and the throws.

Pistons are mounted like any round work. Only pistons of full skirt type without relief can be handled with this equipment. Note hand traverse of carriage with limit stop in place.

Many additional pieces such as brake drums, flywheels, discs and other flat surface parts can be handled.

Ryerson Enlarges Detroit Plant

Continuing the Ryerson tradition of providing real service, a new high-bay type span has been added to the Detroit plant.

The new span increases floor space by over 30,000 sq. ft., bringing the total floor area to approximately 250,000 sq. ft. In addition to housing part of the hot rolled steel stock, the new building will greatly increase facilities for Ryerson's complete reinforcing steel-service to contractors and builders.

Over 1000 new products and sizes were added to the wide range of steel and allied products now carried, giving the plant one of the most complete steel stocks in the vicinity.

Stocks and facilities throughout the entire plant were rearranged for quick assembly of material on the loading platforms.

A plant-wide pneumatic tube system assures rapid filling of orders. Thirteen modern cranes speed stock handling, while railroad sidings having a 15-car capacity take care of inbound and outbound freight shipments.

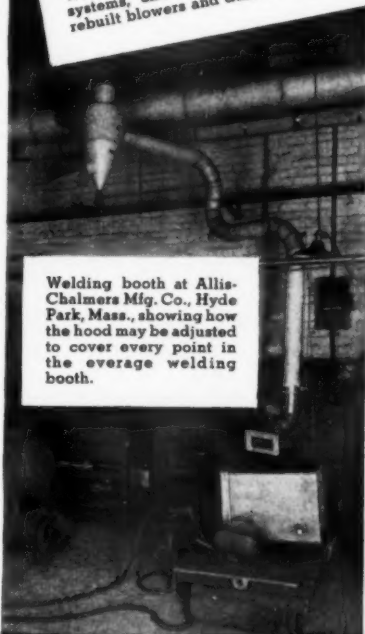
Joseph T. Ryerson & Son, Inc. operate a total of 10 large and complete steel-service plants in the principal industrial centers of the country. Each plant stocks a wide range of steel and allied products and has developed exceptional facilities for filling the varied requirements of steel-consuming industries.

Ryerson recently pioneered in the steel warehousing industry by inaugurating the Ryerson Certified Steel plan wherein the company certifies as to the uniform high quality of all steel carried in stock.

Safeguard YOUR WORKMEN

Keep workrooms and factories free from dust and fumes. The Berg Fume and Dust Collecting Unit is extremely flexible, and is quickly and easily moved to cover every spot within a circular space of 12 feet in diameter. The Berg Unit is constructed entirely of metal. Low in first cost and up-keep, and easily installed. Approved by State Department of Labor and Industries. Write for further details.

We install all kinds of dust collecting systems, and carry in stock new and rebuilt blowers and dust collectors.



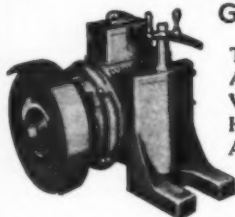
Welding booth at Allis-Chalmers Mfg. Co., Hyde Park, Mass., showing how the hood may be adjusted to cover every point in the average welding booth.

C. F. BERG & CO.

72-74 E. Dedham St.

Boston, Mass.

WODACK GRINDERS



Tool Post
Angle Plate
Vertical and
Horizontal
Adjustment
7 Types

Extension for internal grinding. Full ball bearing. Air cleaner. Also other types of lathe grinders, and portable hand grinders.

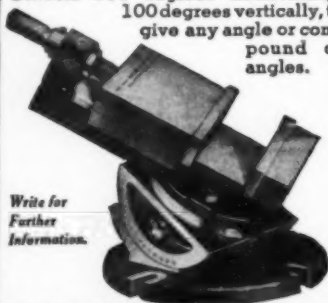


Send for Bulletin 393.

Wodack Electric Tool Corp., 4629 W. Huron St., Chicago, Ill.

New Britain UNIVERSAL VISE

Swivels 360 degrees horizontally, 100 degrees vertically, to give any angle or compound of angles.



Write for
Further
Information.

NEW BRITAIN TOOL & MFG. CO.
NEW BRITAIN, CONN., U. S. A.

Laminex Culvert

An interesting new booklet, tells step-by-step, the processes involved in the manufacture of Laminex Culvert. Creosote treating of the wood is covered in detail with illustrations. Then the making up of the laminated sections and the interlocking corner construction. A series of views show the actual installation of a culvert on an Iowa road. Additional pictures shows culverts of many types. Address The Wood Preserving Corp., Leeds Station, Kansas City, Mo., for a copy.

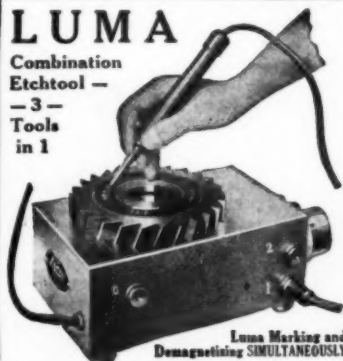
Wet Floors

One of industry's serious problems is wet floors. A new folder on Concretendense tells of a remedy. It is issued by Flexrock Company, 2305 Manning St., Philadelphia, Pa.

Concretendense produces greater density in concrete floors, and makes the slab or resurfaced area impervious to liquids. The wearing surface so produced is smooth, hard and rugged and it will give many extra years of service.

LUMA

Combination
Etchtool —
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Tools
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Luma Marking and
Demagnetizing SIMULTANEOUSLY

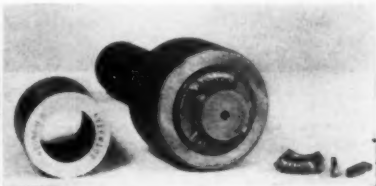
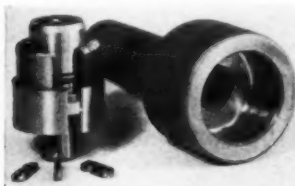
Writes on hardened steel — demagnetizes at the same time—with carbon point does light spot annealing and soldering jobs. Compact—easy to use—dependable.

Send for details—5-day FREE TRIAL OFFER!

Luma Electric Equipment Co.
Dept. H—Main P. O. Box 132, Toledo, Ohio

Marking Device Eliminates Set-Screws

Designed for marking annular parts such as gears, bushings, bearings, etc., in quantity production, a new marking device announced by New Method Steel Stamp Co., 149 Jos. Campau, Detroit,



eliminates the usual set-screws, etc., required to hold removable type in place.

The type holder comprises of five basic parts:—(1) a central flanged shaft, against which flange is assembled (2) a hardened and ground annular anvil

disc, (3) a snap ring in a groove machined in the shaft for locating the type during assembly through grooves cut in the type and (4) an outer spring-steel split sleeve which holds the type in place. Expansion of the sleeve after

assembly is impossible since the entire assembly is carried with a slip fit in (5) the type holder body.

The shaft shank of the inner assembly is ground with an angular flat to provide positive locking. To change type, a set-stud is unscrewed, permitting removal of the inner assembly

TURN THIS RING

FOR THE ADJUSTMENT



A BETTER BOLT DIE STOCK FOR BETTER BOLT THREADING

Owners report die life increased ten to twelve times with a "TOLEDO" No. 101. Easier cutting. Better threads. There is a reason. "TOLEDO" No. 101 $\frac{1}{4}$ " to $\frac{5}{8}$ " and No. 102 $\frac{1}{2}$ " to 1" are the finest adjustable bolt die stocks made. Use the coupon. Get complete information on these remarkable new tools. **NEW LOW PRICES.**

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SEND ME INFORMATION ON THE NEW
"TOLEDO" ADJ. BOLT STOCKS
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"ALNOR" Velometer
An All Purpose Air Velocity Meter
— Instantaneous,
Direct Reading.



Measures total and static pressures as well as velocities.

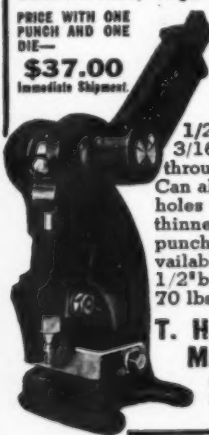
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ILLINOIS Testing Laboratories, Inc.
150 W. Austin, Chicago

**T. H. L. FRONT LEVER
BENCH PUNCH**

Built for hard, tough work — die cannot lose alignment with

PRICE WITH ONE
PUNCH AND ONE
DIE—

\$37.00
Immediate Shipment.



punch — all parts interchangeable.

Capacity —
1/2" holes through
3/16" steel; 13/32"
through 1/4" steel.
Can also be made for
holes up to 7/8" in
thinner metal. Stock
punches and dies available from 1/16 to 1/2" by 64ths. Weight, 70 lbs.

**T. H. Lewthwaite
Machine Co.**

(Est. 1890)
311 E. 47th St.,
NEW YORK

from the type holder body. The split sleeve is spread and slipped downward. This permits easy removal of the type and insertion of different characters. After inserting type over the snap ring, the sleeve is slid back up, the entire assembly is reinserted in the holder and the single set-stud tightened. End of the central shaft extends beyond type holder to act as a locating pilot in marking annular parts.

In use, the holder is placed on or against the part with the shaft in the bore of the piece. End of the holder is then given a sharp blow with a hammer.

Type is especially heat-treated to reduce any tendency toward chipping, etc. The holder should be effective in marking parts requiring a considerable number of characters in a limited space, due to the compactness of the assembly.

**\$25 BUYS A POSTEL
(f. o. b.)
(Minneapolis) DIE FILER**

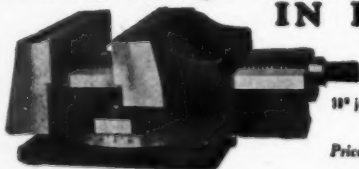


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Write for full information

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Minneapolis, Minn.

**SUPERIOR QUALITY AND WORKMANSHIP
IN PLUNKET VISES**



The Shaper Vise has graduated base and tongue in center to fit slot in table, and has holes for bolting down. In ordering this vise give size of slots in Shaper Table, also distance from center to center of slots.

18" jaws, 2 1/4" deep, opens 8 1/2". Weight 125 lbs. **\$46.80**

Our complete line includes Vises for Drill Presses, Milling Machines, Shapers and Grinders.

Prices are net, f. o. b. Chicago. Write for illustrated folder today. Dealers wanted in unoccupied territory.

SQUARE BASE SHAPER VISE

J. E. Plunket Machine Co. 1823 W. Lake Street
Chicago, Illinois

Lincoln Arc Welding Handbook

The sixth edition of "Procedure Handbook of Arc Welding Design and Practice" has just been issued by Lincoln Electric Co., Cleveland, Ohio. The Handbook is reissued to include all new data essential for the most efficient use of arc welding all its varied applications. The new edition contains the results of two years of fact-finding by a staff of 200 arc welding application engineers contacting every industry throughout the world.

Encyclopedic in scope, concisely written and profusely illustrated, the Handbook is a complete arc welding guide. Written especially for use of designers, engineers, architects, production managers, welding supervisors and operators, the Handbook contains a wealth of data and enables all individuals who design for welding, manufacture or build by welding or use welding in any way to keep abreast of this fast - growing field.

The eight sections of the book cover the following subjects: —Welding methods, Equipment, Technique, Procedures, Cost, Structure and properties of weld metal,

Weldability of metals, Designing of machinery and arc welded structures, Typical applications in all fields.

Copies will be mailed, post paid, to any address in the U. S. for \$1.50 per copy; outside U. S. A. \$2.00 per copy.

The Handbook contains 1125 pages and a total of 1557 illustrations, including photographs and drawings. Size is 5 $\frac{3}{4}$ " x 9", which is ideal for desk or shop use. The binding is dark blue semi-flexible simulated leather.

**What are
your Pump
Requirements?**

- Tell us your needs!

- We can furnish **Stock Pumps** in a wide variety of types and sizes—Geared—Vane—Centrifugal.
- Also—**Special Pumps** made to your order.

Write—Brown & Sharpe Mfg. Co.
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**BROWN & SHARPE
PUMPS**



Hamilton Drafting Light

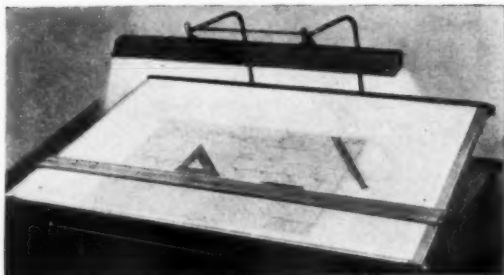
The new Hamilton Fluorescent Light provides man-made north light for drafting purposes.

Under this illumination, colors can be matched as accurately as in actual daylight.

There's another advantage — it is a cool light and it is free from glare, which means that it is easier on the eyes.

The reflector is 44" long, covering the entire drawing table, providing 100 foot candles of illumination directly underneath, and not less than 500 foot candles at the edges of the board. Current consumption is low considering the illumination.

The Hamilton outfit comes complete, ready to use, with tube and transformer. Can be provided for a.c. or d.c. circuits, but the latter requires a



slightly different arrangement.

Address Hamilton Mfg. Co., Two Rivers, Wis., for full details.

Kennametal Chip Breaker Chart

A handy wall chart which illustrates a practical new type of chip breaker design for Kennametal steel-cutting carbide tools, has just been issued by the McKenna Metals Co., 135 Lloyd Ave., Latrobe, Pa. The new design which involves a shallow groove only .004 - .008 in. deep, serves to convert steel chips into short, coiled pieces which are easily shoveled up. The reverse side of the chart shows how this shallow groove may be ground by hand on a silicon carbide or diamond impregnated wheel.

Like previous Kennametal charts, this new one has a hole punched at the top so that it can be hung from the wall or a lathe. It will be sent free to interested readers upon request.

TANNEWITZ DI-SAW

**SAVES AN AVERAGE OF \$4.80
EACH HOUR IT'S USED**



Inside and outside cuts on dies, shoes, templets and endless other jobs can be done in a small fraction of the time required by former methods. Saws, files and polishes. A highly developed, large capacity machine.

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GRAND RAPIDS - MICHIGAN

Sanding and Polishing Machines



Light, Heavy,
Production types
for Industrial Use

\$45.00 and up Factory

Send for circular

THE NEDCO CO.

87 Rumford Ave., Waltham, Mass.

Lyon Trucks with Hydraulic Elevating Tables

Circular No. 115 presents the line of trucks with hydraulic elevating tables made by Lyon Iron Works, 103 Madison St., Greene, N. Y.

Of two principal types, the cantilever and the toggle lever types, the trucks are useful in keeping materials, parts or skids at convenient heights for machine operators or assemblers—for sheet handling, die and roll handling and for stacking or tiering of materials.

Onsrud Routing Bits and Cutters

An attractive new catalog with a bright blue and silver bronze cover does a splendid job of introducing and describing the comprehensive line of cutters offered by Onsrud Machine Works, Inc., 3906 Palmer St., Chicago, Ill.

Fifty pages are devoted to cutters of all types. The illustrations are large and clear, and the text is presented in an interesting way.



STANDARDIZED JIG BUSHINGS

Prompt delivery from stock on over 10,900 standard items—over 6700 ACME Standard—over 4200 A. S. A. Standard—all completely finished ready for use. *Special sizes made to order.*

Made in our new plant by the most exacting and scientific methods—insuring accurate fit plus long wear—concentric within .0003" full indicator reading.

Send for bulletin containing complete data and low prices. Satisfactory service guaranteed.

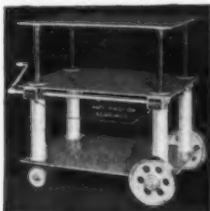
Also manufacturers of complete machine parts, specializing in hardened and ground parts requiring extremely close limits, lapped fits, etc. also hydraulic appliances for pressures up to 20,000 lb. per square inch.

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210 N. LAFLIN ST., -:- CHICAGO, ILL.

"Not a Shop Accessory; a Shop Necessity"

**The
HAMILTON PORTABLE
ELEVATING TABLE
"PORTELEVATOR"**

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*Contributing to Lower Production Costs in
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Punch Press Room*

**HAND AND POWER OPERATED—
One to 20 Ton**

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The Hamilton Tool Co.
B and Wayne Sts. Hamilton Ohio

SHOCKPROOF

**Can't damage any working
parts.**

\$5.00



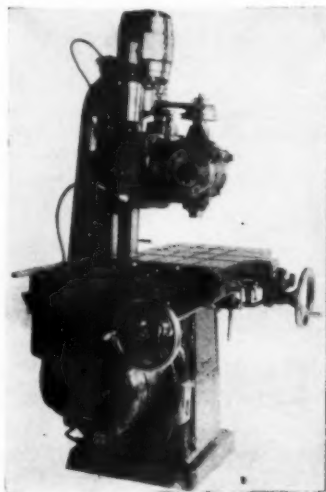
The Koch Test Indicator is constructed so that the plunger moves away from, instead of against the lever, preventing the delicate parts from being broken by a sudden or excessive jolt of the plunger. The balanced torsion and compression springs assure sustained accuracy. Two live ends permit inside and outside measurements to .001".

Write TODAY for bulletin.

The Koch Test Indicator
29 2nd Ave., Nyack, New York

Hack Announces New Model

A new high speed model of the versatile Hack Multi-Versal is offered by the Hack Machine Co., 1228 Harding Ave., Des Plaines, Ill.



It affords spindle speeds up to 4500 r.p.m., and is especially adapted for precision camera and optical work. All attachments are interchangeable with the normal speed machine.

The new machine presents the following innovations:—High speed roller bearing horizontal spindle; high speed roller bearing vertical head; high speed auxiliary universal head for angular work; new electrical control system with push button controls with full overload and safety protection; illuminated vernier scales; focus control with touch feed controls, etc.

Combining 30 different and distinct functions in a single machine, the new Hack Multi-Versal handles most of the familiar jobs in tool and die departments and can also be used as an auxiliary production unit. All of the functions are performed with tool room accuracy and precision and the operations include:— jig boring; vertical and

NICHOLSON CONTROL VALVES

are made in two, three and four-way types for air, oil, water, steam, gas, etc., pressures to 5000 lbs. Style E is a general purpose valve for pressures to 300 lbs. Various metal combinations to suit any medium. Style J is for air and oil only, pressures to 125 lbs. Style H is a balanced hydraulic valve for pressures to 5000 lbs. We also manufacture foot, solenoid and motor-operated valves.



Style J



Style E



Style H

Bulletins on request.

OTHER NICHOLSON PRODUCTS: Mandrels, Arbor Presses, Flexible Couplings, Steel and Stainless Steel Floats, Steam Separators, Steam Traps, Air Separators, Air Traps, Air Vents, Etc.

W. H. Nicholson & Company

117 OREGON STREET

WILKES-BARRE, PA.

THE LATEST TOTALLY ENCLOSED DUST-COLLECTING FINISHER



ARMGLO "SPEEDSTER" ABRASIVE BAND FINISHER

makes sanding . . . surfacing . . . polishing and burring of castings . . . dies . . . stampings . . . die castings . . . moulded products and machine parts an easy and quick operation. It eliminates slow, costly hand labor. In addition to fast production you get finished work that is flawless. Pays for itself many times over in time and labor saved. *Send TODAY for descriptive bulletin.*

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MILWAUKEE, WISCONSIN

SHELDON

**Back Geared Screw Cutting
PRECISION LATHES**

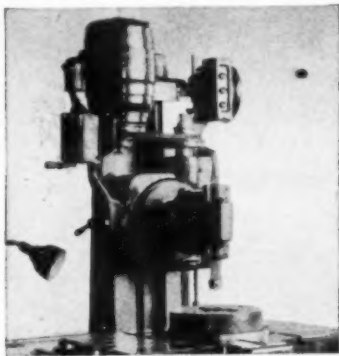


**A
COMPLETE
LINE of**

moderate priced
10", 11" and 12"
Precision Lathes . . . full
size, full weight, built to
industrial standards with
large ground steel spindles,
brass bearings and hand
scraped ways.

**\$108 and
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horizontal milling; slotting, filing, drill-
ing, grinding; broaching; sawing; jig
sawing; lathe work; cam cutting; Lap-
ping; form tool planing; key seating;
template cutting; graduating; rack
shaping; gear cutting; die sinking;
routing; engraving; duplicating; con-
tour milling and many combinations of
reciprocating and rotary cutting.

THE ONLY CHIP BREAKER GRINDER with the UNIVERSAL BALL JOINT VISE

It's a quick and easy precision job to grind
chip breakers, curlers, rake angles, etc., on
Carbide Tools with the new STRICKLAND
Diamond Wheel Precision Grinder equipped
with the STRICKLAND Universal Ball Joint Vise.



The Vise, which can be
purchased separately, gives
instant settings—any required
angular setting in relation to
edge of cutting tool—any ver-
tical, horizontal or compound
setting required. A single
clamp screw releases Vise
setting.

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This perfect location gives you easy access to all parts of Cincinnati. The ideal accommodations at the Palace will make your visit delightful.

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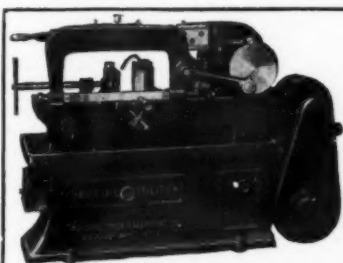
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INCLINABLE POWER PRESSES

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W-3B "RACINE" Wet Cut Utility Saw,
6" Capacity.

Available in two types—the Wet Cut Model and the Dry Cut Model—6"x6" Capacity.

Tear out the attached coupon and get our free catalog No. 70A. You will be surprised to learn of the savings to be made using these modern RACINE machines.

The most complete line with
RACINE Heavy Duty Hydraulic Saws 10x10 to 14x20
RACINE "Shear Cut" Screw feed Saws 6x6 to 8x9
RACINE Hydraulic "Oil Cut" 6x6
RACINE Utility Saws 6x6 and Racine Duplex Bandsaws.

"STANDARD THE WORLD OVER"
RACINE TOOL & MACHINE CO.
 1754 State St., Racine, Wis.

RACINE

High Speed Metal Cutting Machines HYDRAULIC UTILITY SAWS

Here are moderately priced saws designed to handle your general shop cutting in the most efficient and fastest manner. These Utility saws contain those advantages of Hydraulic feed and control formerly found only in expensive production machine tools.

Hydraulic operation reduces moving parts to a minimum—No friction drives, ratchets, or screws to wear or cause hose power loss. RACINE Utility saws prolong blade life because of their smooth oil-cushioned operation. Their sturdy, rugged construction gives you the fastest, most accurate cutting with the least cost.

Please send me catalog No. 70A on RACINE Utility Saws. Also general catalog on complete line.

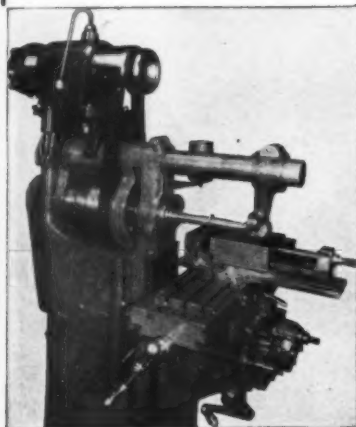
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New LIMA GEARSHIFT MOTOR



FEATURES

Eliminates countershafts . . .
4 speed automotive transmission . . . All steel, heat-treated gears run in bath of oil . . . Hand wheel rotation of machine spindle . . . Instant reversability with all speeds . . . Designed for 1800, 1200 and 900 r.p.m. motors, either single or two speed . . . Adaptable for flat or "V" belt . . . Easily installed.

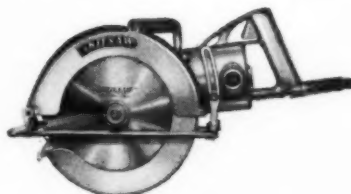
Write for complete information.

LIMA
ARMATURE WORKS, INC.
440 N. MAIN ST. LIMA, OHIO

Skilsaw Announces New Saw

An improved new model has just been added to the line of Skilsaw portable electric hand saws and it incorporates many new features.

Known as Model "127," it has a 12" blade and cuts to a depth of 4 3/8". It is ideal for mine construction work and all timber cutting on docks and dam super-structures, and it is used by railroads in bridge construction work and for cutting ties in maintenance-away work. It is very practical for cutting many types of building tile and for continuous cutting of copper sheets up to 5/8" thick, lead sheets up to 2" thick and many types of heavy gauge corrugated metals. It will rip and cross-cut timbers up to 4" full, and bevel-cut lumber 3-5/16" thick at 45°. The blade has a free speed of 2400 r.p.m. and is protected by an automatic spring-operated telescoping guard that rotates on ball bearings.



It is 22" long. The frame is made of special die-cast aluminum alloy. All shafts are mounted on ball bearings. A blower arrangement built into the upper guard keeps the line of cut free of sawdust.

Address Skilsaw, Inc., 4747 Winnetmac Ave., Chicago for further details.

For Sealing Joints

A joint seal claimed to be completely resistant to propane, pontane, butone, benzol, gasoline, naphtha, grease and oils of all types is now available. This material, known as Glycoseal, is said to be flexible, leak-proof and non-cracking, and joints may be broken

DYER SPOT WELDERS

from
2½ KW to 35 KW
Bench and Floor Type

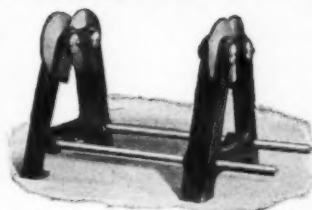
Dyer Welder & Engineering Co.
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Kansas City, Missouri, U. S. A.

THE WELDER OF 1000 USES

For Sheet Metal
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ANDERSON Improved Balancing Ways



Every shop handling rotating parts needs this simple, sturdy, dependable device for balancing, straightening and truing operations. Saves time and trouble and assures better work.

Four chilled iron discs rotate with minimum friction on sensitive special bearings, giving a prompt, sure indication of whether or not the work is in perfect balance.

Write NOW for full information.

Swing	Greatest Distance Between Standards	Capacity in lbs.
20 in.	20 in.	1,000
40 in.	30 in.	2,000
60 in.	30 in.	2,000
72 in.	66 in.	5,000
96 in.	88 in.	10,000

ANDERSON BROS. MFG. CO., ROCKFORD, ILL.
1907 Kishwaukee St.

Centerless Grinding

(CONTRACT WORK)

**PRECISION, FINE FINISH,
LOW COST**

May we quote on your specifications.

THE HEIM COMPANY
Fairfield, Connecticut



Severance countersinks are designed to take heavy cuts and at the same time produce an amazingly smooth seat. The cutting teeth are so

arranged as to give a shearing cut and make chatter almost impossible. Special countersinks made in various combinations of angles, diameters, lengths, ball nose, double angle, and shank types and sizes.

Submit your problems with full particulars to our engineers or write for Bulletin No. 12-B.

Severance Tool Manufacturing Co.

1510 East Genesee Ave. Saginaw, Mich.

easily without damaging the fittings. It can be used on rubber (which it does not attack) as well as all kinds of metal fittings. Its use in proparte service, both liquid and gas, shows its effectiveness even under difficult conditions.

It is asserted that Glycoseal will not harden under usual conditions of application. Samples left exposed to the air remain fluid and do not soak through textiles or other porous materials with which they come in contact.

Further information, samples, etc., can be obtained from the manufacturers, the Glyco Products Co., Inc., 148 Lafayette St., New York, N. Y.

Spray Painting Handbook

The "A B C of Spray Painting Equipment," published by DeVilbiss, describes just about every conceivable item of spray painting equipment and their functions are explained, in the five parts of the book. The subjects treated are the Paint Spray Gun, its troubles, remedies and accessories; Material Containers; Hose and Hose Connections; Air Transformers and Condensers, and Air Compressing Outfits.

The material is presented in question and answer form. A studied effort has been made to refrain from highly technical or involved terms. Added clarity is lent the text by the frequent illustrations and diagrams.

Single copies may be obtained free or arrangements made for procuring copies in bulk, by writing The DeVilbiss Co., Toledo, Ohio.



The "BABY GIANT" VANDERBEEK Universal Joints

are obtainable in two sizes—the "Baby Giant" for instrument and control work; and the "Giant", with hardened and ground working surfaces for heavy duty work.

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Foredom Flexible Shaft Tools

A low-priced, quality line of flexible shaft tools for fine craft work is announced by Foredom Electric Co., (Dept. 143) 27 Park Place New York

An important advantage of the tool is the lightweight, pencil-size hand-piece which permits finger-tip control and ease in working in hard-to-reach places.



The tools have many uses, among which are:—grinding, polishing, sawing, slotting, sanding, milling, engraving, routing, rust-removing, carving, inlaying, undercutting drilling, sharpening, etc. They are said to be indispensable in die and tool departments. Over 200 accessories are available for use with the tools.

Sets comprising universal motor, flexible shaft, hand-piece, assortment of accessories and adjustable wall bracket for supporting motor are fully described in the catalog.

Rogers Improves Knife Grinder

An improved Type "B" automatic knife grinder has been added to the line by Samuel C. Rogers & Co., 203 Duton Ave., Buffalo, N. Y. It is made in five sizes to accommodate knives from 26" to 54" long.

Some of the highlights are a heavy, well-reinforced carriage bed, sturdy knife bar and increased weight which

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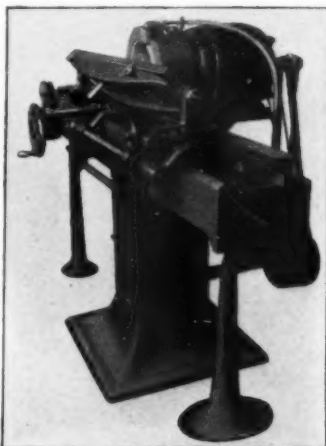
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are said to combine to provide greater accuracy and exceptionally long service in a low-priced machine.

This new Type "B" is adapted for grinding knives edge up or down. It is equipped with a 1½ h.p. motor and 10" diameter grinding wheel, providing added capacity. It is designed for grinding a variety of knives including paper, hog and woodworking knives as well as light shear blades.

Skilsaw Issues New Catalog

Resplendent in its bright new blue and silver cover, catalog No. 41 is exceedingly attractive. More than 50 pages are devoted to illustrations and descriptions of the complete line of Skilsaw portable tools and handy index tabs facilitate reference. Sectional and cut-away illustrations show the design and construction of many of the tools and there are many photos of typical applications.

Address Skilsaw, Inc., 4747 Winnemac Ave., Chicago, Ill., for a copy.

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Considering only such major specifications as weight and sizes of motor, wheels, bearings, spindle diameters, you'll find a lot of other machines to compare with MARSCHKE ELECTRIC GRINDERS and BUFFERS.

But do not overlook the less spectacular and more important items of material specifications, workmanship and particularly the provisions for lubrication, bearing and motor protection, and above all the details of wheel guard construction.

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BECAUSE OF its unique design, the Erickson Precision Chuck collet grips equally firm from front to back. No loosening even when holding on flutes.



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Open-slotted at BOTH ENDS, the Erickson collet can accurately collapse its 8 gripping surfaces by $1/32$ ". Therefore grips correctly even on flutes or slight shank tapers.

Sizes $1/2$ " dia. to No. 80 Drill.

Chuck Shank can be made to fit any type spindle, Male or Female.

ERICKSON STEEL CO.

East 80th & Bessemer,
Cleveland, Ohio

Guildsander G-3

The Syracuse GuildTool Co., 1720 No. Salina St., Syracuse, N. Y. announces a new portable electric sander using standard 3"x24" abrasive belts. With a belt speed of 1350 feet per minute, this tool is claimed to speed up sanding and surfacing operations on wood, metal, marble, slate, plastics, and other composition materials. Equipped with a $1/2$ h. p. universal mo-



tor, it operates on any 110 volt AC or DC line, or can be supplied for other voltage requirements.

It is balanced, compactly built and easy to handle. All moving parts, including the drive and idler pulleys, are equipped with precision ball bearings. Its patented belt aligning control is said to insure proper belt traction regardless of motion used. Another patented feature is its quick belt change latch.

Light in weight (only 15 lbs.), the new sander is a time-saver on bench and holding jobs. The sturdy frame is of cast tough aluminum alloy and has a highly polished, mirror-like finish.

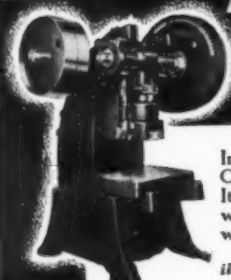
Shafer Double Row Roller Bearings

Shafer Bearing Corp., 35 East Wacker Drive, Chicago, announces a new type of double row roller bearing available in "DE" 200 Series, sizes from 3.1490" to 5.9045" bore; and "DE" 300

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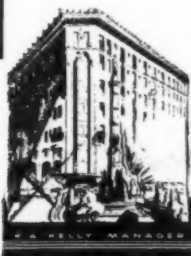
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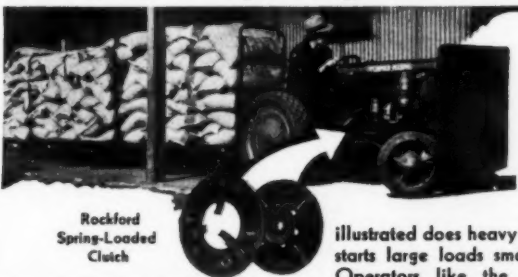
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swivels and locks in any position. Can be varied 15½° by slight foot pressure, leaving operator's hands free. Engineered and built by tool engineers, experienced in production of special machines, dies, jigs and fixtures for exacting requirements.

Send **TODAY** for illustrated catalog No. 2.

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112 Webster St., Dayton, Ohio

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Equipped with a Rockford Spring-Loaded Clutch, the industrial tractor

illustrated does heavy hauling around warehouses, starts large loads smoothly, pulls them steadily. Operators like the easy action of Rockford Clutch, especially when working in close quarters.



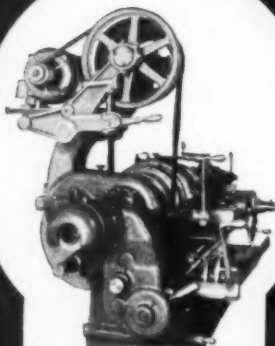
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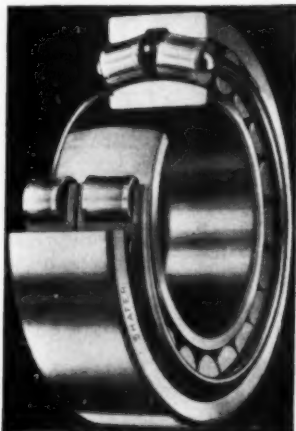
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The "DE" Series is a self-contained double row angular contact type. Shafer concave rollers operate between



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Complete specifications, dimensions, and load rating data for Shafer "DE" Series bearings are given in Catalog No. 15, recently published.

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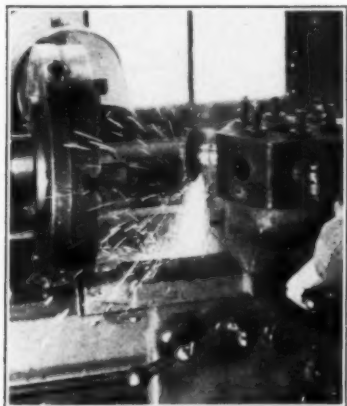
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CAN BE
REPLACED.

Wheels for Difficult Precision Grinding

Atlantic Abrasive Corp., 522 Pearl St., South Braintree, Mass., announces two wheels for the particularly difficult precision grinding involved in high speed steels and similar metals.



Atlantic Type L. B. is for fast, clean cutting on tools or dies. Atlantic claims to have developed a patented synthetic bond to eliminate heat and prevent clogging or glazing, and a grit that stands up under the hardest use. The wheel comes in all grain sizes from coarse to fine, with the latter particularly recommended for grinding cast iron and alloy pistons, etc., and for precision grinding of all steels.

Type S. B., which also comes in all grain sizes, is a medium tempered wheel for grinding all fine tools made of high speed steel, stellite, carboloy and other alloyed steels. It is asserted to permit maximum working speed and pressure without danger of burning.

Full details on these and other special wheels for steel, alloys, plastics, and leather will be sent on request.

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Stick to the fairway. Keep out of the rough. Two good ways to improve your score . . . If you need a better score in screw-machine output, let Sutton DIAMOND-GRIP collets keep production on the fairway, away from trouble with slippage. They grip tighter under less tension. Sutton Feed Fingers are perfect caddies for Sutton Collets.

Sutton DIAMOND-GRIP Collets



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SUTTON TOOL COMPANY
2895 W. GRAND BLVD. DETROIT, MICH.
Accessories for Screw Machines

Grob Improves Files and File Chains

Grob Brothers, Grafton, Wis., announce new files and file-chains of improved design.

For smooth, clean-cutting action, files on a continuous motion filing machine must be accurate in thickness, width and shape, and guided so that one file follows the next without being out of line. The makers assert that for smooth performance, accuracy of the files must be kept within .001" to .002" and the alignment must be equally accurate.

The new construction is claimed to provide perfect alignment, and also an overlapping feature, since ends of the files are cut at an angle. At the left is shown the new provision for alignment of the files and to the right, the files, guided and passing through the working zone.

Into the ends of files on the rear side, small slots are milled which fit closely into projections of the chain links



behind the files. Thus, as the files enter into a straight line path after leaving the pulley, they are, individually locked into perfect alignment since the slots of the files lock with the projections of the chain-link and the file chain in the working zone is closely guided by the file support guide.

Chip clearance is provided, by having the file chain guide slightly deeper than the depth of the chain. These new features are covered by patents held by Grob Brothers.



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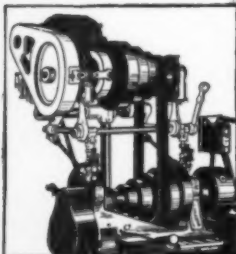
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Edges of the steel strip are trimmed to uniform width before entering the



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4 JAW INDEPENDENT L-W LATHE CHUCKS

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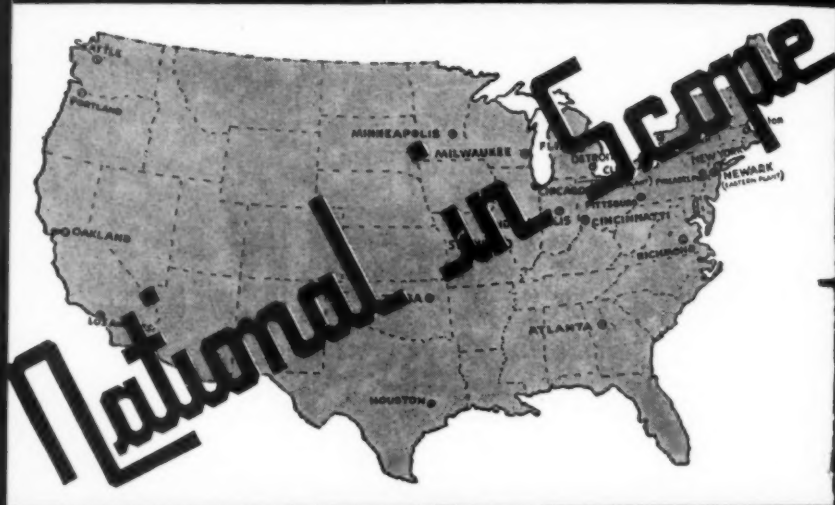
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hole detector, between guides and hold-down blocks to guide the flying strip accurately through the machine. Two light sources are mounted in the enclosing cabinet overhead, and the phototube housing is mounted below the moving stream of metal sheet on a separate foundation to avoid vibration. The slightest hole in the steel strip lets the light through, actuating the photo-tube and a marking device that scores the strip alongside the hole. Two control cabinets mounted on the side are for the detector unit and for the marker. Immediately beyond the pin-hole detector is a machine to cut the strip into exact lengths, which may be adjusted over a wide range. After leaving the flying shear the strip goes to a classifier which has a gate timed with the hole detector to open and discharge all defective sheets to a pit below. Final process in the line is to pile the sheets into stacks for convenient handling.



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THE FASTEST METHOD OF HOLDING PARTS IN POSITION DURING WELDING, MACHINING & RIVETTING OPERATIONS.

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Automatic Gear Broaching

Reduction of manual handling to a minimum is accomplished in this finish broaching operation on gear bores at an automobile plant. Gears are merely dropped into pot-chucks on an indexing

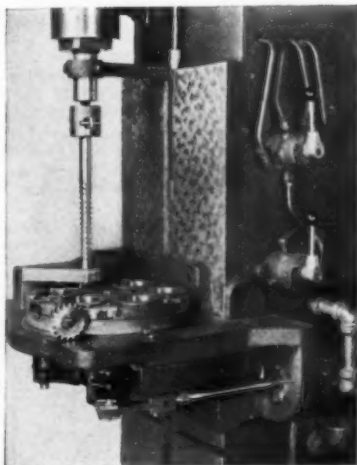


table. The Colonial open side utility broaching machine used is completely automatic in operation.

In operation, the ram carries the broach through the hole, and returns it to the top of the stroke. Through a ratchet and pawl mechanism, hydraulically operated, the table then indexes 1/6th turn and the broach finishes another gear. Finished parts

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Severance Tube Burring Cutters burr or chamfer tubing both inside and outside in one operation. In a shearing cut which forces the chips out and prevents loading, these cutters quickly and easily finish tubes in sizes from 1/16" O. D. and up.

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SEVERANCE TOOL MFG. CO.
1510 E. GENESEE AVE., SAGINAW, MICH.

drop out below on the far side. A plunger lock is provided for accuracy in index locating of table.

Production is given as 450 pieces per hour. All the operator does is to drop parts into the pot-chucks. The latter are so designed that they may be removed and other sizes installed in a few minutes for broaching other sizes of gears.

The machine, incidentally, is also interesting for its flexibility. While the stroke for this operation is only 10", maximum stroke of the machine is 18" while its capacity rating is two tons. The work carrying table may be lowered on the column to provide as much as 45" daylight between the bottom of the ram and the fixture carrying table.

Additional details may be had from Colonial Broach Co., 147 Jos. Campau St., Detroit.

De Vilbiss Offers New Units

Featuring an attractive, modern, streamline design, excellent performance and an appealing price, a new known as the NCB, is announced by



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Although the line consists of five different spray equipment assemblies, all outfits are built around a radically new and different $\frac{1}{4}$ h.p. electric motor driven air compressing unit. Three are cup gun outfits and two include a pressure feed paint tank of two gallon capacity.

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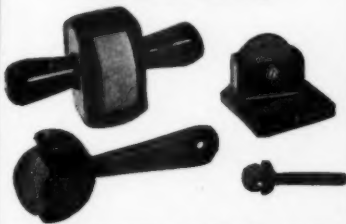
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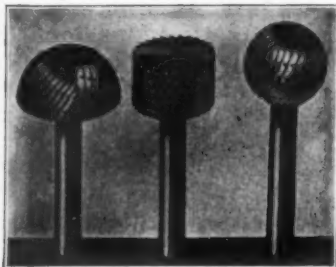


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ber form an integral unit enclosed in a streamlined housing.

Rated displacement is 4.3 cubic feet of air per minute at 40 pounds pressure. Actual air delivered at this pressure is 2.6 c. f. m. Maximum pressure 50 lbs.

Flame-Hardened Small Parts

The principal advantages which flame hardening possesses over the older heat treating methods are:—(1) to minimize distortion which might be encountered in liquid quenching the part all over, and (2) for selective hardening of the surfaces of parts too large for handling in regular furnaces. However, in the Sept., 1939 Heat Treating and forging, T. A. Frischmann of Eaton Mfg. Co., Cleveland, describes a successful and profitable use of flame-hardening for small articles; specifically, on the cam tracks of clutch actuator cams made of S.A.E. 3150 nickel-chromium steel.

Ordinarily such parts would be oil-quenched in batches, but the need for high hardness on the track portion only, and the fact that heating above the critical point and quenching all over caused too much expansion to get a snug fit in the threaded portion, led to the adoption of selective flame-hardening of the track. This not only achieved the desired end, but improved manufacturing operations since the threads could be cut after hardening the track portion. Distortion was cut to practically zero. The hardening machine was installed in the machining line so as to avoid transportation to and from the heat treat department, and cleaning operations were eliminated.

("Nickel Steel Topics")

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Taper and Straight Dowel Pins Made to Order
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Great flexibility as to capacity, number and size of bins. Available in any number of sections. Will not tip over even when loaded on one side only. Additional sections easily added at any time. Easy to move when necessary without dismantling.

Shipped knocked down. Erection requires only a wrench and hammer.

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The Cincinnati Clamp Co.,

1945 WAVERLY AVENUE,
CINCINNATI, OHIO



Fig. 732
Pat'd. & Pat's. Pend.
Drawer is extra.

"HALLOWELL" Steel Work-Benches

Splinter-proof tops, lasting rigidity and easy movability are advantages incorporated in every one of the 1367 styles and models of "Hallowell" Benches available for your selection.

DURABLE, INEXPENSIVE PRODUCTION AIDS



Fig. 1334

"HALLOWELL" Steel Stools

Welded steel construction insures lifetimes of rigid support. Many models to choose from.



Fig. 1112

"HALLOWELL" Steel Tool Stands

Keep tools handy but safe in this movable stand which can be locked to prevent "borrowing."

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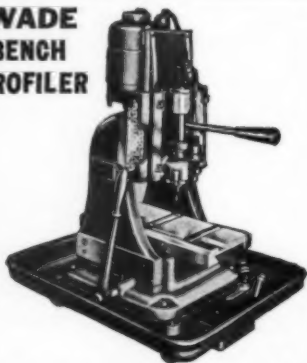
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For rapid production in recessing and slotting operations.

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with the A.M. Sensitive Tapping Machine ... from the smallest and finest up to $\frac{3}{16}$ " diameter in steel and iron—and up to $\frac{1}{4}$ " in softer materials. A modern unit

that within its capacity, will take all the punishment intense production can inflict.



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HAMILTON, OHIO

Lake Erie Gap Presses

Addition of a line of hydraulic straightening presses using "C" type gap frame design is announced by the Lake Erie Engineering Corp., Buffalo, N. Y.

The presses shown are rated at 66 tons capacity. Pressures are accurately controlled by hand lever. Heavy steel side plate design is used for rigidity.



Stroke is 16" with fast operating speeds as follows:—55" per minute closing; 31" per minute pressing; 70" per minute return.

The entire press is self-contained with pumping unit enclosed in base. Working space is easily accessible. These units are adapted for all types of straightening work including finished shapes such as aircraft parts and similar pieces requiring final straightening after drawing or forming.

Elpro Portable Printer

The Elpro portable printer, offered by the Oxalid Corp., Johnson City, N. Y., has been developed for applications where occasional prints are required. It will make positive type reproductions in sizes up to 12" x 18" of engineering drawings, maps, letters, reports, and in fact, any pencil or ink lines, type-written, or printed matter appearing on one side of a reasonably translucent material.



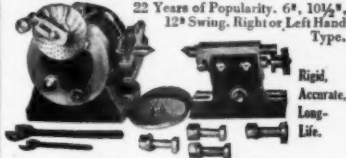
Exposure is made by six specially designed lamps with a total current load of 800 watts. The lamps are rated for 100 hours. Equipment operates on an ordinary lighting circuit, 110 volts AC or DC, and it is readily portable. A

time release switch allows the operator to regulate exposure automatically.

Print and sensitized material are held in contact by a printing frame hinged to the cabinet proper. The exposed print is developed dry in a developing chamber located directly behind metal reflector. The printing operation requires from two to three minutes, depending upon the type of original used and dry development takes between three and five minutes.

CARROLL Universal Dividing Heads

22 Years of Popularity. 6", 10½",
12" Swing. Right or Left Hand
Type.



Rigid,
Accurate,
Long-
Life.

WM. CARROLL & SON

1776 Lexington Ave., (Norwood) Cincinnati, Ohio

GRANT RIVETERS

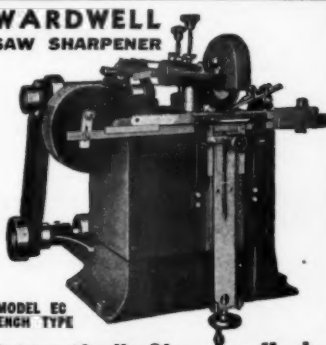
include both Noiseless Spinning and Vibrating Hammer types of machines—also Vertical and Horizontal Multiple Spindle Spinning Machines.



Send
unriveted
samples
with
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for
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dation
and
quotation.

The Grant Mfg. & Machine Co.
C. E. Station BRIDGEPORT, CONN.

WARDWELL SAW SHARPENER



MODEL EG
BENCH TYPE

Automatically Sharpens Hack, Band & Circular Saws

with teeth as fine as 32 to the inch,
at a speed of 30 to 75 per minute.

WRITE FOR CIRCULAR

The Wardwell Mfg. Co.
3165 Fulton Rd. Cleveland, O.

Stow Adds Truck-Mounted Model

A flexible shaft machine designed for easy portability around factory floor or yard is announced by Stow Mfg. Co., Inc., 30 Shear St., Binghamton, N. Y. It makes use of a two-wheel truck mounting, which carries either the direct connected motor-and-shaft unit or the multi-speed, belt-and-pulley driven unit. The truck base is of heavy cast iron construction, carrying



two 8" wheels and has an extending leg to provide three-point stability, even on rough surfaces. A ball bearing swivel is provided so that even the heaviest type of unit may be turned easily in a horizontal direction. This new model is especially suitable for heavy duty work.

Lyon Truck In Action

The March issue (page 132) announced a Lyon sheet handling truck with hydraulic elevating table.

Here is a view of this truck as installed in the plant of a prominent manufacturer of electrical equipment.

The truck is supporting a load of steel sheets in front of a press, ready for

LITTELL *Pres-Vac*
SAFETY FEEDER

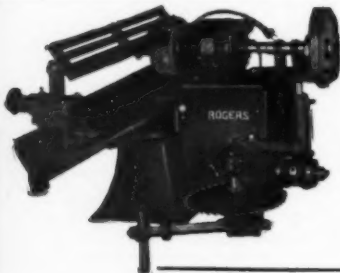


KEEPS HANDS OUT OF DANGER ZONE

PRESSING trigger creates strong vacuum in cup for holding flat-surface materials for feeding to press. Releasing trigger releases piece held. Keeps hands out of danger zone. Single and double-cup types.

ASK FOR BULLETIN 9-C.

F.J. LITTELL MACHINE CO.
4153 RAVENSWOOD AVE. CHICAGO ILL.



ROGERS Type E Combined Knife Grinder and Saw Sharpener

Supplied with belt drive or built-in ball bearing motor. Can be furnished with or without saw gumming attachment for circular saws up to 22" in diameter. The lowest priced, high grade combination grinder on the market. 3 sizes: 26", 32" and 38". Write for details.

We make a full line of knife grinders and saw sharpeners.

SAMUEL C. ROGERS & CO.
201 DUTTON AVE., BUFFALO, N. Y.

**BENDING
BRAKES****WHITNEY-JENSEN****METAL
TOOLS**

Combination
ROLLER BEARING, BENDING BRAKE

**A COMBINATION TYPE**

BRAKE. Quickly convertible from plain bending to box and pan bending. Roller Bearing. Available in 12, 14, & 16 ga. 4-5-6-8-10 ft. sizes.



WHITNEY METAL TOOL COMPANY
115 FORBES ST., ROCKFORD, ILLINOIS



DON'T BURN UP YOUR ENERGY

Let Nilson Tilting Wire Reel Lift It

Lost motion, false motion and unnecessary motion all cost money. Only a little at a time perhaps, but over the period of a year, the total would be impressive. Why not save this?

Useless motion also represents a loss. Lifting heavy coils of wire wastes time and energy. Why not let **NILSON** save this too?

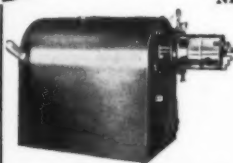
A foot lever is tripped, the guards removed, a coil of wire slid upon the carrier, the guards replaced and set screws tightened, an easy lift, and the counter-balancing weight does the rest, bringing the tilting section to a vertical position, ready to feed the wire into the machine.

Send today for Bulletin No. 51 and learn how you save in other ways too.

The A. H. NILSON Machine Co.
BRIDGEPORT, CONN., U.S.A.

SCHAUER Speed Lathes

PRODUCTION NECESSITIES



for
speedier
grinding
lapping
filing
polishing
small
parts

Variable Speed Lathe

Any desired spindle speed *at will*—from a low of 65 r.p.m. to a maximum of 6300 r.p.m., at a ratio of 13 to 1—simply by moving a hand lever! Does the job quicker, better, cheaper!

Equipped with Standard NEMA frame motor, completely enclosed; automatic braking system; 3-jaw universal chuck. All parts quickly, easily accessible. Rugged. Occupies 12"x18" bench space.

Write for Cir. 400. We design lathes to meet your individual production requirements.

SCHAUER MACHINE CO.
2064 Reading Road, Cincinnati, O.

OTC GRIPOMATIC PULLERS

FOR PLANT MAINTENANCE

Capacities 5 to 40 TONS

Patented grip prevents slipping, avoids damage, eases work in close quarters. Alloy steel—guaranteed.

OTC PULLING SYSTEM

includes many sizes and types. Pushers and Pullers to install or remove gears, bearings, wheels, pulleys, sleeves, shafts, etc.

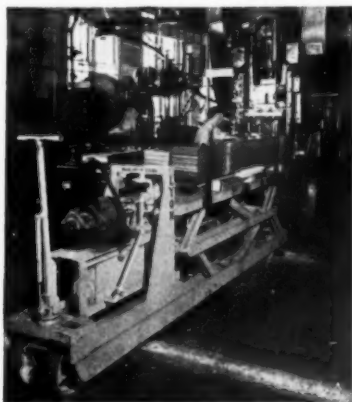
Write for catalog.

SPECIAL PULLERS designed. Ask us about your special tool needs.



OWATONNA TOOL CO.
355 CEDAR ST. OWATONNA, MINN.

feeding. The sheets have been placed on the table of the truck by a power fork tiering truck.



Control of the motor driven hydraulic pump for lowering and elevating the table is placed close to the operator so he can keep the load of sheets at proper height for easy feeding of the press.

Any additional information desired may be obtained from Lyon Iron Works 508 Madison St., Greene, N. Y.

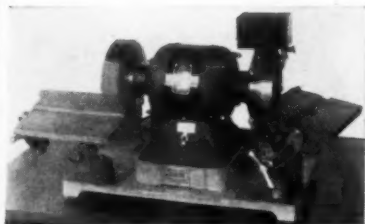
Dykem Hi-Spot Blue No. 107

Bearing scraping and fitting is facilitated by a new preparation developed by The Dykem Co., 2301 N. 11th St., St. Louis, Mo.

Known as Dykem Hi-Spot No. 107, this new paste is intensely blue. It is smooth, soft and free from grit. The makers emphasize the fact that it is always uniform from batch to batch—and that it does not dry out. A thin coating can be left on the master or bearing surface indefinitely, and it remains wet and transferable. This is a decided advantage when working on large surfaces where the operations are continued from day to day. There is no time lost removing dried bluing and re-bluing the working surfaces.

FOR CARBIDE TIPPED TOOLS THE ALL IN ONE TOOL GRINDER

Complete with —



TWO WORK TABLES

ONE 6"x1½" GRINDING WHEEL

ONE 6"x½" FACE DIAMOND
SET LAP

ONE PROTRACTOR

110 VOLT, 60 C. A. C. MOTOR
1750 R. P. M.

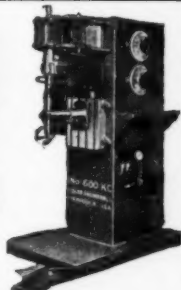
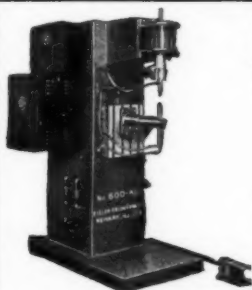
PRICE COMPLETE.....\$108

220 V. 60 C. 3 PHASE MOTOR \$5.00 extra

230 V. D. C. MOTOR \$10 extra, PEDESTAL IF DESIRED \$20 extra
DELIVERY FROM STOCK

T. C. M. MFG. CO.,

Harrison, N. J.



We manufacture a complete line
of **ELECTRIC SPOT WELDERS**
from ¼ to 500 K.V.A. for weld-

ing Brass, Aluminum, Bronze, Stainless Steel, Galva-
nized Sheets, Monel, Molybdenum, Tantalum, Ni-
chrome, Tin Plate, Copper, Nickel, Silver, Gold, Etc.
We can supply a Welder for any need.

We invite contract Spot Welding in large or small quantities.
We also make standard and Special TRANSFORMERS of all kinds.
A. C. ARC WELDERS from 100 to 400 Amps.

For any further information write direct to—

CHAS. EISLER

EISLER ENGINEERING COMPANY

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Newark, New Jersey



ALL ALLOY PORTABLE SHEARS

FULLY GUARANTEED



Two Sizes

No. 1 cuts up to No. 11 gauge strip or sheet.
No. 2 cuts up to $\frac{1}{4}$ " steel plate.

Special Blades for shearing stainless steel.

BREMIL MFG. CO.
1720 Pittsburgh Ave., Erie, Pa.

STILL GOOD !



AFTER 2 WEEKS
hard SERVICE

KENAMETAL Proves Its Reliability

Unretouched photograph above shows a KENAMETAL shaper tool which was used daily for two weeks in shaping manganese silicon steel of 30 Rockwell "C" hardness. Note that the KENAMETAL tip is not shattered or broken but is merely worn a little on the cutting edge. It has had many useful re-grinds during its life.

You, too, can be sure of dependable performance... and great savings in machining costs... by specifying KENAMETAL-tipped tools for your steel-cutting jobs. Write for new catalog today.



McKENNA METALS Co.
135 LLOYD AVENUE
LATROBE, PENNSYLVANIA, U.S.A.

Ideal BX Armor Cutter

Nicked wires, bending of cable, fusing, shorts, and wasted BX are some of the things eliminated by a new BX Armor Cutter announced by the Ideal Commutator Dresser Co., 1441 Park Avenue, Sycamore, Ill.



The tool is of handy pocket size and easy to use. Jaws are formed to take BX cable of any make, two or three wire No. 12 or No. 14.

It cuts quickly and cleanly without injury to wire insulation. Cuts anywhere along length of cable for opening into outlets, switch boxes, etc. Hardened steel cutting blade is removable for sharpening. Weight, complete, only 12 ounces.

Johnson "Hi-Speed"

The Johnson Gas Appliance Co., 524 E. Ave., N. W., Cedar Rapids, Iowa, announces a new "Hi - Speed" heat-treating furnace. This No. 70 is designed primarily for high speed steels, but can be used effectively for carbon and intermediate steels and is useful for hardening punches, dies or tools.

With firebox temperatures of 2500°



for your lathes

SENECA FALLS
Automatic
WORK DRIVER

Self Centering... Quick Acting... No Slip. Attaches to any chuck plate or spindle. Provides a slip-proof, balanced drive reducing chatter. Handles rough forgings or turned pieces—straight or taper. Eliminates dogging time. Reduces tool breakage. Write for details and size range.

SENECA FALLS MACHINE CO., 314 Falls St., Seneca Falls, N. Y.

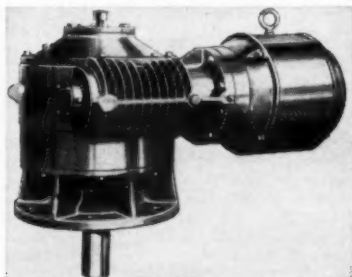
F., it is asserted that tools can be heated uniformly and will come out clean and scale free.

The insulating refractory firebox lining is $2\frac{1}{2}$ " thick, and a carborundum hearth is standard equipment, assuring long life. The burners are placed under the hearth. G-E motors are furnished, which have cast iron housings, cast aluminum fan wheels, and gas and air adjustment for temperature regulation. Doors in front and rear allow heating of bars and rods. Two sizes are available in either bench or pedestal style.

Janette RW5P Speed Reducer

Janette Mfg. Co., 556 W. Monroe St., Chicago announce their new RW (right angle worm gear) style of reducers.

Large radiating surfaces are provided for heat dissipation, and cooling fins are cast integral with the section of the housings enclosing the worms.



Worm gearing is employed for the first reduction and planetary gearing for the second reduction, which causes the spur gears to turn so slowly that they are said to be practically noiseless.

In the first reduction, a hardened alloy steel worm is used with a cast bronze gear, which has the teeth cut to conform closely to the worm. The large bronze gear is keyed to the hub of a steel pinion which is in mesh with the three steel planet gears of the second reduction. The planet gears turn on hardened steel studs, located 120 degrees apart on a heavy steel disc,

EVANS

High Speed Steel REAMERS

LOOK AT THESE FEATURES

- No honing.
- Will not chatter.
- Chrome-like finish.
- Perfect alignment.
- Full bearing surface.
- Left and right spirals.
- 50 to 80 thousandths expansion.
- Cannot fall in slots or oil grooves.
- Extension pilots for line-up work.

**Will Ship On
30 Days Trial**

Write for Circular

EVANS
FLEXIBLE REAMER CORP.
Ravenswood & Wilson
CHICAGO





"CHAMPION" Steel Racks

Save time, steps and money by keeping bar stock, shafting and pipe out of the way and off the floor.

Write for full details.

**The Western
Tool & Mfg. Co.**
Springfield, Ohio

NAILS · RIVETS · SCREWS
MADE TO ORDER IN ANY METAL

HASSALL
Products
CLAY & OAKLAND STS.
BROOKLYN, N.Y.

New
Catalog
Will Be
Ready Soon.

Write for
Illustrated Catalog

which is forged integral with a rugged countershaft.

The disc is driven by the rolling action of the planet gears between the steel pinion and a large internal gear, cut directly into the inner surface of the heavy, nickel cast iron housing of the second reduction.

The letter P following the RW designation indicates planetary.

RW machines are supplied in four sizes, the RW1P, RW3P, RW4P and RW5P, exactly alike except in size. They are supplied with motors ranging from 1/6 up to 10 hp. Single phase, squirrel cage, slip ring and direct current motors are available for driving these motorized units. The countershaft speeds range from 59 to 52 r.p.m.

Westinghouse 58" Fluorescent Lamp

A new 85-watt 58" type RF fluorescent lamp producing white light and designed especially for industrial service is announced by Westinghouse. The new lamps may be operated on either 105-125-volt or 210-225-volt 60-cycle a-c circuits in special equipment which provides direct current through the use of a rectifying device. The new white and the blue-white lamps are interchangeable in single and twin fixture units available.

Color of the light produced by the white lamp is somewhat like that of the daylight Mazda F (fluorescent) lamp. It is suitable for a wide variety of industrial uses, including those where color discrimination is important. Light output is about the same

OPEN THE WAY TO GREATER PROFITS



BY USING



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BUTTS AND CONTINUOUS LENGTHS — for GUARDS — CABINETS — CASES — BOXES — LUGGAGE

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S & S MACHINE WORKS

HARDWARE DIVISION

4530 WEST LAKE STREET

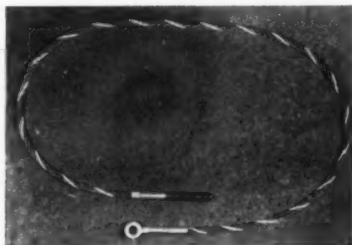
CHICAGO, ILLINOIS

as that of the blue-white unit, rated at 4,250 lumens. Operating amperes (approx.) 0.9; color (approx. 8000° Kelvin) white; bulb T-10; bases special prong; rated average laboratory life 3000 hours.

Additional information may be obtained from the Westinghouse Lamp Division, Bloomfield, N. J.

MacWhyte "Safe-Lock" Terminals

These terminals are available in eye end, fork end, turnbuckle end, and



stud end types. They are especially valuable where a trim, efficient, safe fitting is needed on wire ropes that operate or control machinery.

Because socketing with zinc or splicing is not employed in making the attachment, the terminals are small and compact. Metal in the terminal is "married" to the wire rope, thus they are claimed to develop the full strength of the rope.

Terminals in stainless steel have been supplied for control cables on aircraft and are now available in a complete range of sizes for general industrial uses.

Terminals are also made in nickel steel and can be supplied attached to wire ropes of stainless steel and monel metal, as well as standard steel ropes. They can be made into specification lengths of wire rope.

Address Macwhyte Wire Rope Co., 14th Ave., Kenosha, Wis., for further details.

Faster, easier, more accurate layout work with JOHANSSON ACCESSORIES

- Johansson accessories increase the usefulness of Johansson Blocks. They make layout work easier and increase your speed and accuracy.
- Johansson accessories come in a variety of forms and sizes and can be combined for use on a great variety of jobs. There are, for example, ten sizes of jaws, three types of adjustable holders with fourteen different size openings, and four triangular straight edges.
- The best way to find out which accessories will help you most is to fill in and mail the coupon for a Johansson Catalog. It lists all accessories, sets and prices.

FORD
MOTOR COMPANY
Dept. C
JOHANSSON DIVISION
Dearborn, Mich.

Please send me free copy of Catalog No. 14.

Name

Address

City State

Lubricating U. S. Motors

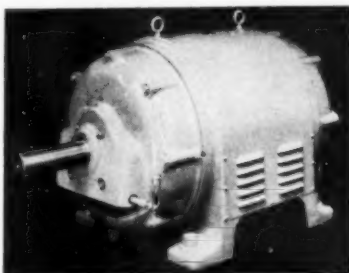
U. S. Motors have just developed an oil lubrication system which is now being supplied on all open type SA and Unicoiled type SC motors larger than 30 h.p. 3600 r.p.m., and 75 h.p. 1800 r.p.m.

An oil gauge is supplied, marked with maximum and minimum levels, which may be easily checked. It takes but a few minutes to check and refill the oilers on these motors.

Longer bearing life is said to result from the improved lubrication properties of oil as compared to grease, and the better care which is taken of the bearing. The oil level is maintained just slightly over the outer race of the bearing with the result that sufficient oil is always present and yet the bearing is never overloaded with oil. Such a condition of lubrication results in a cool operating bearing.

Maintenance costs are reduced and better care is taken of the bearing as

the housing may be flushed frequently, whereas the disassembly of the motor



to wash out old grease requires considerable time and expense. There is no chance of the grease caking in the housing resulting in insufficient lubrication. Write for more information:—U. S. Electrical Motors, Inc.; Dept. 65; 80 - 34th Street; Brooklyn, New York.

JOHNSON *Hi-Speed* Heat-Treating Furnace Gives 2500° F.

No. 70 with
Firebox Size **\$79.50**
9"x7½"x5"

New, low-cost all-purpose furnace, suitable for forging, heat-treating Hi-Speed steels, carbon and intermediate steels, tempering and hardening punches, dies and tools. Firebox is heavily lined with 2½" insulating refractory. Carborundum hearths are standard equipment. General Electric motors furnished with Johnson blower. Available in 2 sizes, in either bench or pedestal style.

No. 120—Firebox size
13½"x7½"x5"

JOHNSON GAS APPLIANCE CO.
Cedar Rapids MADE IN U.S.A. **IOWA**

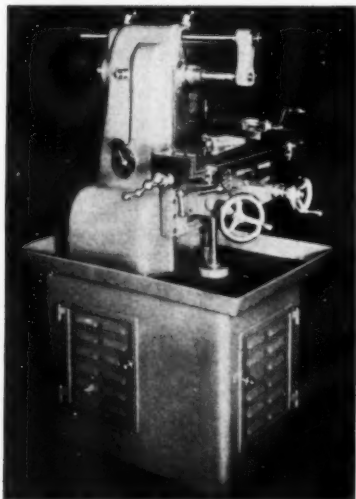
524 E Ave. N. W.

ESTABLISHED 1901

We welcome your problems relative to gas application in heat treating, or any gas burner equipment. Send for new Johnson Catalog.

Hardinge "TM" Milling Machine

A new model precision preloaded ball bearing tool room milling machine is announced by Hardinge Brothers, Inc., Elmira, N. Y. Designated as the "TM," the new model replaces the BB5 previously offered.



A number of refinements are evident, resulting from careful study of the requirements of precision tool room millers. A longer vertical travel is provided to permit use of the index head in the vertical position.

The horizontal spindle nose and spindle nose of the index head are identical and of the threaded type, allowing interchangeability of chucks and other spindle nose fixtures. Collets are also interchangeable between the two spindles.

The horizontal spindle has been extended over the table to permit small end mills to get to the work without the use of overhung adapters.

Either of two high spindle speed ranges is available, viz., from 110 to 1850 r.p.m. or 110 to 2775 r.p.m. In



with **IDEAL** Marking Equipment

MARK YOUR TOOLS—Prevent loss, theft, use of wrong sizes, confusion in the tool room.

MARK YOUR PRODUCTS—Make it easy for customers to send you repeat orders.

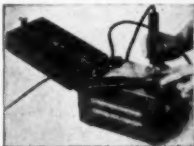
MARK YOUR PRODUCTION PARTS—Prevent mistakes and delays in production.

MARK YOUR PROPERTY—Prevent loss and theft.

New **IDEAL** "Universal" ELECTRIC ETCHER

The Last Word In Etching Equipment.

Complete, yet compact — entirely self-contained in beautiful streamlined case. The new "Universal" permanently marks iron, steel or their alloys. Plate on which objects are placed for marking may be replaced should it become rough. Ground clamp is provided for objects too large to place on plate. 4-heat switch regulates etching. Special cork handle resists heat. Weight, only 16 pounds.



THE MOST COMPLETE LINE ON THE MARKET

"Standard" Etcher—for etching gauges, tools and other small, smooth-surfaced objects. 3-heat switch regulates etching. Weight, 12 pounds.

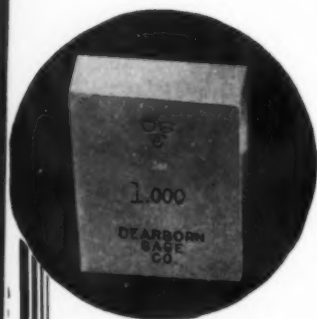
"Heavy Duty" Etcher—for etching smooth-surfaced castings and other large objects. 10-heat switch regulates etching. Weight, 35 pounds.

"Electric Marker"—works similar to an electric hammer—makes 7,200 cutting strokes per minute. For marking all materials: steel, brass, bakelite, glass, hard rubber, etc. Entirely self-contained. Special diamond point available for marking extra hard materials to 60 Rockwell, Scale C. Weight, 19 oz.

Ask For Free Demonstration

Electrical Products Division

Ideal Commutator Dresser Co.
1441 Park Ave., Sycamore, Illinois



*Today
It's*

Dearborn Gage Company

Chrome Plated GAGE BLOCKS

The only accepted Chrome Plated Standard—made by the Originators of Chrome Plated Gage Blocks . . .



DEARBORN GAGE COMPANY

*"Originators of Chromium Plated
Gage Blocks"*

22035 Beech Street
DEARBORN • MICHIGAN

both cases, the slow, low spindle speed is retained for use when required.

The machine is anti-friction bearing equipped throughout, the overarm being so equipped to prevent possibility of "freezing" at high spindle speeds.

The milling machine column has been enlarged for heavier cuts and greater rigidity.

The machine is readily operated by the use of one lever only, which operates the electrical control mounted on an accessible panel inside column.

The steel pedestal driving unit completely encloses drive, in which no loose pulleys, gears or clutches are employed.

The bevel gears and transverse feed nuts are completely enclosed in the box type knee to exclude foreign matter. All slides are taper gibbed. Large dials, graduated in thousandths, make for easy reading and operation.

The machine is offered with or without power feed for longitudinal travel of the table. Power feed is of the V-belt driven type, contributing to better finish. Thirty-two feeds are available, ranging from approximately $\frac{1}{8}$ " to 13" per minute.

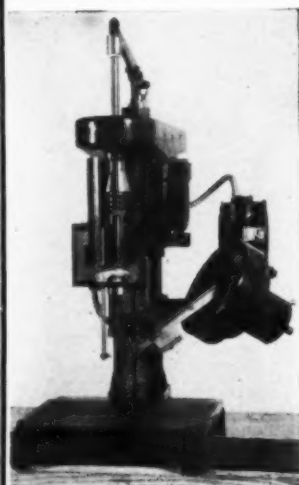
A new bulletin "TM" gives complete details.

Simplifying V-Belt Calculation

Medart announces a new V-belt drive catalog, showing new ratings of Medart V-Belts which permits more precise and economical selection of V-Drives.

The catalog has been prepared in simplified form. It requires but a fraction of the time to figure the correct belt and sheave combination from the data shown, as compared to former methods. This simplified form eliminates complex mathematics and intricate engineering computation, making it easy to determine the correct V-belt drive combination for any specific drive problem.

A copy of bulletin 84-C may be obtained by writing The Medart Co., 3538 DeKalb St., St. Louis, Mo.



Announcing

NEW MODEL "A"

Magazine Feed Power Screwdriver

The Machine you have been waiting for
Drives No. 2 to No. 6 screws.

**A STURDY—EFFICIENT—PRACTICALLY
DESIGNED MACHINE.**

Eliminates the troublesome handling of small screws.
Screws always in sight of operator.

Sensitive, easily adjusted spindle clutch to meet all
requirements of screw tension.

Table designed for conveniently operating machine
over conveyor belt.

Write for circular.

SEND SAMPLE ASSEMBLIES FOR PRODUCTION
ESTIMATES.

DETROIT POWER SCREWDRIVER CO.
5363 ROHNS AVE., DETROIT, MICH.

BALDOR

BALL BEARING GRINDERS

for
HEAVY
PRODUCTION
WORK

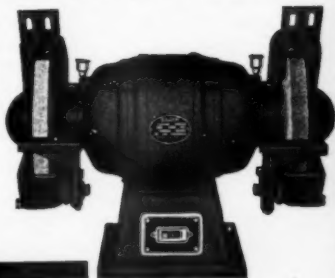
Xtra Heavy AND Excess H. P.

A powerful, heavy-duty 10" Grinder. Heavier and
more H. P. than usual for it's wheel size. $1\frac{1}{2}$ h. p.
3-phase motor; 220 volts, 60 cy., 1725 r. p. m. $10 \times 1\frac{1}{4}$
wheels. NET WEIGHT, bench type, 155 lbs. (Also
available in Pedestal type) 1-YEAR GUARANTEE.

No. 101 — Bench Type — **\$84.00**

ASK FOR BULLETIN 64
ON COMPLETE LINE

BALDOR ELECTRIC COMPANY
4368 DUNCAN AVE., ST. LOUIS, MO.



Duro Tension Measuring Wrenches

In many kinds of assembling, uniform and accurate tension is mighty important in the tightening of nuts and bolts. That's the purpose of the new kit of four handy wrenches announced by Duro Metal Products Co., 2655 N. Kildare Ave., Chicago, Ill.

The $\frac{3}{4}$ model is for heavy duty jobs. It is provided with $\frac{3}{4}$ " square drive and indicates up to 300 foot-pounds.



The $\frac{1}{2}$ " general purpose wrench handles all work up to 100 foot-pounds tension.

A $\frac{3}{8}$ " model is recommended for servicing aluminum cylinder heads, spark plugs, connecting rods, airplane struts, wings, etc. It is also useful in refrigeration work. It is made with $\frac{3}{8}$ " square and registers up to 65 foot-pounds.

The $\frac{1}{4}$ " model is designed especially for fine instrument adjustments, generators, starters and ignition work. Furnished with $\frac{1}{4}$ " or $9/32$ " square drive, it registers up to 120 inch-pounds.

A new four-page bulletin gives complete information and shows the wrenches in use on typical jobs. Extension adapters, extension offsets, universal joint adapters and Duro-chrome long tapered thin nose sockets are also presented.

Why Wrestle WITH Magnetic Chucks ?

As a sport, Wrestling may be good exercise—but it's a pain in the neck when you have to tug, pry and hammer work free from magnetic chucks.

It wastes time that might be gainfully employed.

It exhausts the operator and tries his patience. Fatigue means a drop in production, increased chance of error and accident—and impairment of quality.

Frequently it results in damage to the work or face of the magnetic chuck. It costs money to repair and reface chucks.

Hundreds of leading manufacturers have found that NEU-T-ROL releases work from magnetic chucks promptly and surely—and demagnetizes it. Helpful on small chucks, NEU-T-ROL is essential on big jobs. Leading manufacturers will supply NEU-T-ROL built-in on your new grinding equipment—if you specify it! Write TODAY for full information.

ELECTRO-MATIC PRODUCTS CO.
4036 N. Kolmar Ave., CHICAGO, ILLINOIS



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● The pulse of the city—Michigan Boulevard. Chicago works and plays to the tune of its rhythmic hum. In the most convenient location on this famous thoroughfare, Hotel Auditorium provides spacious pleasant rooms, excellent service and superb cuisine, at reasonable rates.

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WITHOUT BATH from \$1.50

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HOTEL AUDITORIUM

Just What You Have Been Wanting—An Economical Live Ball and Roller Bearing Center.



For Lathes, Hand Screw Machines, Grinders, and Mills

1. Simplicity and sturdiness adapt this center to heavy duty with extra long life.
2. Sufficient bearings for radial, thrust, and alignment loads resulting in 50% more radial load than the average live center.
3. Large spindle, small head, and short overhang spells rigidity—result, no chatter.
4. Has special oil seal to retain lubricant and resist foreign matter.

A folder giving prices and complete detail will be mailed to you just for the asking.

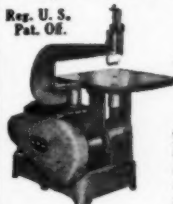
A lower first and last cost. Let us prove it by sending you one today for a ten day trial, and if not satisfactory in every way returns it.

MOTOR TOOL MFG. CO.
12281 Turner Ave., Detroit, Mich.

The "Butterfly"

Filing and Die Making Machine

Reg. U. S.
Pat. Off.



NEW MODELS D. & E. L.

The "Butterfly" owes its ever increasing popularity to its high standard of efficiency. It is the quietest machine of its kind and is well adapted to highly accurate work. It is being used by the leading manufacturers of the United States and Europe and also by the United States Government.

Constructed as per specifications of United States Naval Aircraft Factories.

Beware of Imitations!
Our machine carries the Butterfly trade mark.

Write for folder
D. and E. L.

HARVEY
MANUFACTURING CORP.
161 Grand St., New York, N. Y.

WISE

With and
Without Jig
Attachments

FOR DRILL PRESS

Often used
on Miller,
Shaper or
Planer.

6",
9",
12"
Jaws



Send for Circulars

Fig. 2
Without Jig
Attachments

KNURL HOLDER

FOR TURRET LATHES



Swivel
Lugs

Shank
made to
suit turret

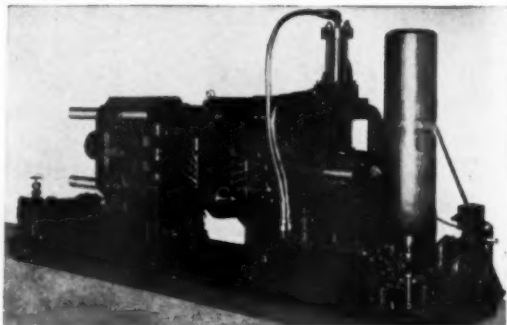
Operates like
Screw Die.
Adjustable
within capacity.
Straight Cut
Knurls in
Swivel Lugs
Produce Standard
Knurling.

THE GRAHAM MFG. CO.
70 Willard Ave., PROVIDENCE, R. I.

G & M Develops New Die-Casting Units

The G & M Mfg. Co., Cleveland offers two new and improved high-pressure hydraulic die-casting machines — one for zinc, tin and lead-base alloys, and the other for aluminum, brass and magnesium alloys.

Similar in engineering and construction, the machines are designed to accommodate larger dies, to increase production and reduce waste, to give a tighter seal on dies and largely eliminate flash, etc. Base, framework, die plates and toggle links are made of solid steel plates, flame-cut and welded. Welding has been substituted for bolting and riveting wherever possible. The result is said to be a type of die-casting machine heavier and stronger than predecessors and better able to stand the terrific wear—



and—tear off of high-speed production schedules.

Construction of the extra-heavy die plates is claimed to prevent possibility of breakage. Welding at juncture of toggle link and die plate further increases strength and durability.

Accurate Hole Transfer Made Easy With NIELSEN TRANSFER SCREWS



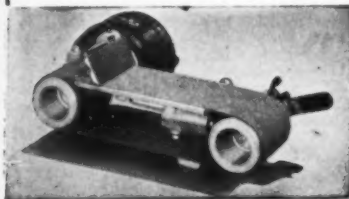
Simply insert in holes, invert, strike sharply and you have centers and drill circles perfectly located. Reduce time and eliminate spoilage of other methods. 7 sizes U.S.S.—Inexpensive—last for years.

Write for Circular
NIELSEN TOOL & DIE COMPANY
1859 Gardner Ave.
Berkley, Mich.

The toggle arrangement permits moving and locking of the die plates with a hydraulic pressure of less than 300 pounds against the actuating mechanism. Construction and design of the toggle mechanism, however, provides an actual locking pressure of approximately 500,000 pounds.

A feature of the toggle linkage is that no strain is exerted on the link pins in stopping forward motion of the movable die plate, as would be the case

AN INEXPENSIVE ABRASIVE BAND GRINDER



"Built Like A Machine Tool"

The Hormel-M Grinder is sturdily built with a supporting leg under the grinding table to eliminate vibration and tipping due to pressure on belt. Ball bearing throughout, equipped with Alemite lubrication, complete with grease gun.

Write for illustrated folder on this and other styles and sizes.

WALLS SALES CORP.

96 Warren St.,

New York, N. Y.



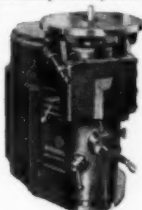
Model No. A

Dispensing with skilled workmen, this speedy and versatile modern unit gives a rapid precision machine operation. The short oscillatory movement eliminates lines in ground parts. Handles straight, smooth, square surfaces and may be adjusted to any desired angle. Can be used on form tools including Tungsten Carbide. Will show savings up to 80% on tool and die cost—with added accuracy.

Write for bulletins.

Peters Tool Co., Inc.

114 E. Scott St. Milwaukee, Wis.



Model No. 101

Peters Vertical Oscillatory GRINDER

WHY NOT LET Walton Tap Extractors

demonstrate their ability to facilitate quick maintenance of machines, speed production and cut "break-down" costs.



Our 30-day Free Trial offer will prove this to you beyond the shadow of a doubt.

Just send us the sizes and styles you wish. There's no obligation on your part.

Ask For Folder 131

THE WALTON CO.
95 Allyn St., Hartford, Conn.



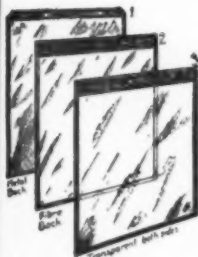
TAKE ANY BOX IN THE PILE . . .

the bottom one is just as accessible as the top . . . if you store your boxes in STACKRACKS. These sturdy, patented steel racks lock together to form rigid storage units of any size, shape or capacity . . . let you pile your boxes and still remove any one without disturbing any other.

STACKRACK storage cuts handling time . . . eliminates wasted effort . . . increases profitable work-hours. Write today for full information and low prices. Stackbin Corporation, 55 Troy St., Providence, R.I.

STACKRACKS
"STACKED AND STILL ACCESSIBLE"

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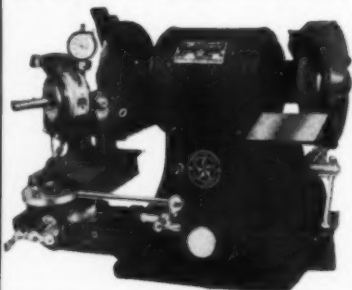
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Any size or style to order, stiff or flexible, to suit your requirements.

Send for folder and quotation.

WADE INSTRUMENT CO.
1422 E. 109th St., Cleveland, O.

Precision Drill Grinder



Simple to operate—dependable—speedy—this Precision Grinder will enable you to produce perfect joints on standard twist drills in sizes from No. 41 (.096) to $\frac{3}{8}$ " (.625).

Send today for more details.

Star Machine & Engineering Corp.

Division Star Electric Motor Co.

Bloomfield, - - - New Jersey

if shoes or stops were used on the links themselves. Instead, the machines are so equipped that the actuating movement of the linkage is stopped when the hydraulic piston which moves it, comes in contact with the movable die plate when the die is locked. Steel hardened bushings are used on all bearing surfaces in the toggle linkage, and the link pins themselves have an exceptionally large diameter.

Tie bars also are unusually heavy, and bearing surface for each tie bar totals 230 square inches, distributed over 22 linear inches. This prevents other than straight forward movement of the die plate, reducing wear and breakage of die aligning pins.

The base is 48" wide and 182" long and weighs approximately 4000 lbs. It is flanged on all sides to prevent water from the die-cooling system running onto the floor, and is reinforced with a 6" steel channel and cross members.

A hydraulic valve arrangement for ejecting and core-pulling is standard equipment on both types of machines, and they are equipped with Vickers two-stage pump and control valves.

The zinc-tin-lead-alloy machine is designed in such manner that the gooseneck or the furnace pot can be replaced without disturbing hydraulic piping.

Driving Small Screws

A new magazine feed power screw-driver for hopper feeding and driving small screws, has been added to their line by the Detroit Power Screwdriver Co., 5363 Rohms Ave., Detroit, Mich.

Its range is from a No. 2 to a No. 6 screw, and from $\frac{1}{8}$ " to $\frac{1}{2}$ " in length.

It is a sturdy machine and yet the makers assert that the spindle clutch is so sensitive there is no danger of twisting off screws heads, even when driving a No. 2 brass screw.

The hopper is driven by an individual motor unit to provide a constant hopper speed, regardless of spindle speed.

The design permits placing the machine over a 12" conveyor belt, if desired. It is operated by a treadle, fastened to the floor, and a touch of the toe operates the stroke of the spindle.

All adjustments are accessible, and



The VERNON MILL— gives you the RIGHT SPEED for every job— at the turn of a wheel!

The Right Speed
For Every Job

Just Turn
the Wheel

As Easy
As That!

Features: Fully-
enclosed Variable
Drive; Choice of
two standard speed
ranges, either 100 — 1000
RPM or 150 — 1500 RPM;
New Departure Ball Bearings
in counter shaft;
spindle has No. 9 B. & S.
taper, mounted in Timken Tapered Roller
Bearings; Can be arranged for power feed.

The sturdy, dependable Vernon Mill gives you accuracy, practical capacity, power, versatility and wide range of speeds, combined with LOW PRICE. To keep costs low, precision high, install Vernon Machine Tools. Write today for bulletin giving full details of Vernon Mills and 11" Shapers.

Dealers: Write today for exclusive territory.



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MACHINERY MANUFACTURING CO.

Manufacturers of THE VERNON LINE
of Machinery.

Box 35, VERNON, CALIFORNIA

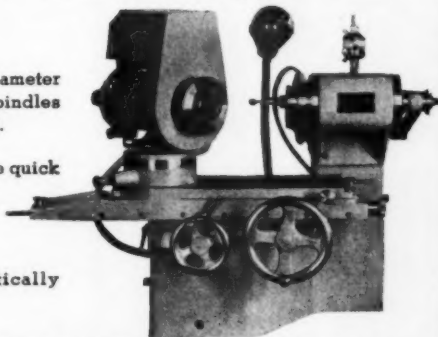
Bergram presents a New Bench Type Internal Grinder Type IG-1

Accurate to $\pm .0001$ ".

Capacity from $3/16$ " to 3" diameter
holes with interchangeable spindles
and speeds up to 35000 RPM.

Suitable for set-ups that require quick
changes for straight, tapered
and beveled holes or for
single-purpose production.

Diamond dresser automatically
controls selected hole size.



BERGRAM MECHANICAL ENGINEERING CO., Inc.
NEW BRITAIN, CONN.



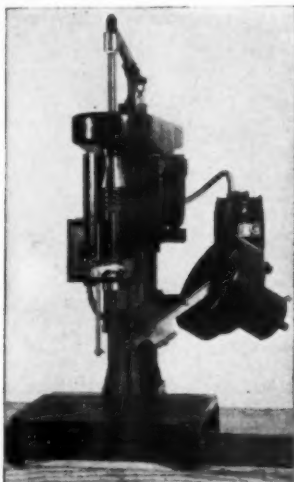
LARGE SIZE
Up to 1 Inch

Each blade in the set of Lufkin Radius gages is a separate unit and can alone be applied to the work, carries the corresponding external and internal forms and has five different applications.

Write For Free Complete Catalog.

THE LUFKIN RULE CO.

TAPES • RULES • PRECISION TOOLS
SAGINAW, MICHIGAN • New York City



the screws are always in sight of the operator. There is no marring of screw heads, and tension to which screws are to be driven is controlled by a simple adjustable lock nut on lower spindle.

Three models are available, rounding out a complete line of magazine feed power screwdrivers capable of driving screws from No. 2 to $\frac{5}{8}$ " cap screws, and lengths up to $1\frac{3}{4}$ ".

Manufacturers having large production assemblies are invited to send samples for estimated production schedules.

**BLUE
DEVIL**

**Socket
Screws**



**COLD
FORMED**

SAFETY SOCKET
2642 N. KINGS AVE.



SCREW CORPORATION
CHICAGO, ILLINOIS

ACRO

Resistance Welders, Foot, Air or
Hydraulic-Operated Spot Welders;
Seam Welders; Gun Welders.

Let us have your specifications or
samples for quotations.

ACRO WELDER MFG. CO., INC.
1570 So. First St., Milwaukee, Wis.

Lincoln Hard Facing Electrodes

The Lincoln Electric Co., Cleveland, Ohio, announces two new hard facing electrodes, designated as "Faceweld No. 1" and "Faceweld No. 12".

These are cast abrasion - resisting alloys used for hard-facing by the metallic arc process. Both are coated electrodes and are said to have exceptionally good arc characteristics, producing a smooth dense deposit. Deposits are very resistant to abrasion but not excessively hard and brittle. "Faceweld" bonds well with all types of ferrous alloys.

No. 1 is a general purpose hardfacing electrode and is softer and tougher. It has good abrasion resistance and very high resistance to impact for this class of material. It is used for surfacing such parts as digger teeth, scarifiers, grader blades, cement plant machinery, etc. by arc welding.

No. 12 is somewhat harder than No. 1 and has superior resistance to abrasion. Its resistance to impact is excellent for this type of material but not

quite so high as No. 1.

Applications include screw conveyors, conveyor sleeves, plows, gyratory crushers, power shovel and dragline bucket parts, dredge pump impellers and casings, coal pulverizer jaws, cement mill machinery, such as Bradley and Griffin rings, crusher roll plates, etc.

Hardness varies somewhat dependent upon conditions under which deposits are made, but in general will be within the range given below. As practically full hardness is shown in the "as deposited state," heat treatment has no material effect.

"Faceweld No. 1"

Single layer hardness approx. 45 to 52 Rockwell C

Multiple layer hardness approx. 52 to 58 Rockwell C

"Faceweld No. 12"

Single layer hardness approx. 52 to 57 Rockwell C

Multiple layer hardness approx. 55 to 59 Rockwell C

These values vary depending upon the material to which they have been applied, and the conditions under which they are applied.

"Faceweld" either No. 1 or No. 12 is furnished in 1/4" size—12" long and comes packed in 5-pound and 10-pound containers.

Method of using these electrodes is as follows:

Polarity: Electrode positive
Current Range: Min. Max. Average
1/4" diameter 150 300 200

Arc Length: Fairly short

Weave beads full width of deposit if possible. In most cases a single layer of "Faceweld" will be sufficient. Deposits over two layers thick are not recommended.

Cleaning off the small amount of slag formed is not necessary when multiple layers are deposited.

Deposits are not machinable and must be ground if shaping is necessary.



New
TRICO
GRAVITY FEED OILERS

UNBREAKABLE - ULTRA-MODERN - STRENGTHENED
NO GASKETS TO LEAK - 10% LESS WEIGHT -
REINFORCED DUAL BATCH FEED ADJUSTMENT.
WRITE FOR BULLETIN No. 26

TRICO FUSE MFG. CO.
MILWAUKEE, WIS.

— FAMCO —



**ARBOR
PRESSES**



**FOOT
PRESSES**

Bench and Floor Models

A stock size and model for most every need, or
a special press for your special requirements.

Send for descriptive literature.

FAMCO MACHINE COMPANY
1320 18th St. Racine, Wis.



Price \$7.50
F.O.B. Chicago

HANDMAG

Demagnetizer AC Portable Type

A low priced, highly efficient unit guaranteed to duplicate the performance of larger demagnetizers now on the market. Will last a lifetime. We invite comparison.

*Send check with order. We prepay the freight.
Territories Open for Dealers*

Victor Machinery Company
130 So. Clinton St., Chicago, Ill.

*Wasted Minutes MEAN
.. Unprofitable Hours*

DON'T LET DANGEROUS DUST AND DIRT
SLOW DOWN OPERATIONS IN YOUR PLANT

**LEARN HOW
YOU CAN SAVE
TIME AND
MONEY
WITH**



A COMBINATION PORTABLE ELECTRIC
CLEMENTS

**CADILLAC
BLOWER & SUCTION CLEANER**

1 HP—2 SPEED AND 4 OTHER MODELS
ASK ABOUT 10 DAYS FREE TRIAL

CLEMENTS MFG. CO.

6651 So. Narragansett Ave., Chicago, Ill.

A Torch-Heated Furnace

The National Safety Device Co., 836 W. Hubbard St., Chicago, announces the addition of a new and useful steel treating and general utility furnace to their attractive line of blow torches.



This Furnace is decidedly unique and different, due to the fact that it is made to operate with the flame of a blow torch. It operates with any make or size of blow torch, and can be raised or lowered easily, so that the flame opening will be in line with the blow torch burner, regardless of the height of torch.

It has long been known that the modern blow torch flame supplies sufficient heat for treating heavy metal parts if the flame can be captured and confined in one place. In fact, many machine shops are using blow torches for the steel treatment of small parts, using common bricks as background for the flame.

The top of this new furnace carries a pan of special heat resisting iron which can be filled with sand and



MD-1

50,000 R. P. M.

AIR TURBINE GRINDER

Vibrationless grinding—one of the reasons experienced die makers like the Onsrud MD-1 Grinder. Here is a 50,000 R. P. M. unit with $\frac{1}{4}$ H. P. that makes work fly. Handles with superb ease—weighs less than 2 lbs. No need to labor over work when you use an Onsrud Grinder. Ball bearing throughout. Automatic oil lubrication. Will not heat up by overloading. Can be mounted and used as stationary grinder. Write for circular.

ONSRUD MACHINE WORKS, Inc., 3908 Palmer St., Chicago, Ill.



heated for drawing the temper on small tools. When the pan is removed, there is a top grating shaped to fit a lead or babbitt ladle in the event the owner wishes to use it in that way.

The door opens level with the inset bottom of furnace which enables the user to pull out the part to be heated upon the open door for examination. Work to be partly heated can be placed on this door while it is open.

The furnace is also useful for heating large soldering irons.

The new Utility Furnace is lined with fire brick $\frac{3}{4}$ " thick and a heavy gauge blue steel shell. Legs and door latch are chrome plated. It is an inexpensive and useful addition to the tool equipment of any shop, laboratory or experimental department.

A Double Boiler Zinc Melter

Out of the kitchen has come the inspiration for a more efficient method of melting zinc.

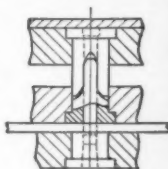
At the Glenn L. Martin Co., in Baltimore much of this metal is used in making dies for bombers and over-ocean transport ships.

Heretofore, zinc has been melted simply by putting it in a pot and then putting fire under the pot. But heat has concentrated at certain points, the zinc has alloyed with the pot metal at these points, and the melted product usually turns up with impurities from the contact. In addition to this, the pots have been short-lived, eroding at the points of maximum heat.

The Martin research staff, developed the double-boiler idea after six months of experiment. They built a big pot with a combustion chamber underneath (for gas, oil, or coal) and covered it with refractory material. In this they melt lead and into the molten mass they dip another pot containing the zinc. Since the heat thus is evenly distributed over the pot, there is no tendency for the zinc to alloy with the pot, the metal is returned in molten form in a high degree of purity, and the inner pot is spared the eroding effect of the zinc at points of extreme heat concentration.



**don't
drill
small
holes**



Here's the principle of the Durable Patented Piercing Punch — the only punch on the market that's completely supported.

"The first real improvement in piercing punches since the advent of high speed steels" — that is what one customer says.

Others say in letters from our files:

"It so far has pierced 132,621 holes without any trouble whatever, which I believe is quite a record for a punch of such small diameter."

"Our troubles were over as soon as the die embodying your punches and sleeves was completed."

"In all cases it has resulted in a remarkable saving over our previous method by greatly reducing our punch maintenance costs."

"We are pleased to report that the punches and sleeves recently purchased from you are doing a satisfactory job."

"We are completely satisfied with the results obtained from this setup."

Punching small holes or large holes — through stock of any thickness. Durable Punches are all that the name implies. Over 80% of our orders are repeat orders from satisfied customers.

Write TODAY for free Handbook.

DURABLE PUNCH & DIE CO.
2224 W. Grand Ave., Chicago, Ill.

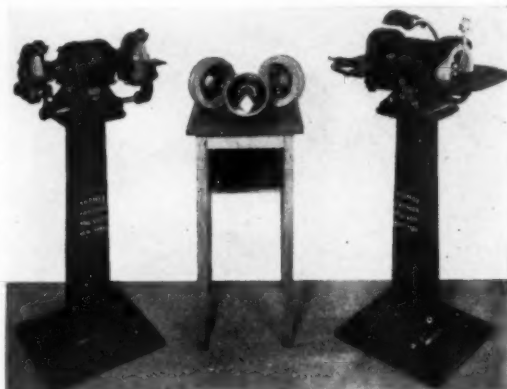
Prosser Carbide Tool Grinding Set-Up

This arrangement is offered by Prosser as an ideal set-up for the complete reconditioning of all types of single point tools — cemented carbide, stellite, or high speed steel. The following procedure is recommended:

When tools are badly worn or chipped, they should be rough ground first on the periphery of a straight wheel. The line-contact offered by the periphery of a wheel, as distinguished from the surface-contact of the face of a cup wheel, provides the best condition for rapid metal removal, with the least generation of heat. For this purpose a simple powerful grinder is suggested, having a coarse straight vitrified wheel on one end for hogging down the shank steel, and a rough open-grained straight silicon carbide wheel for rapidly roughing down the chipped or badly worn carbide tips. The rests should be set so that the shank and tip are roughed down to a clearance angle of a few degrees more than desired on the finished tool.

Then, on the table grinder, a comparatively small amount of grinding on the surface of the silicon carbide cup wheel, with a final touching up on the finishing wheel — either silicon carbide or diamond — results in a perfect cutting edge, free from nicks, with flat clearances, held accurately to the desired angles.

The tables of the Prosser carbide grinder can be adjusted to the angle desired, due to the location of the pivot-point in the same plane as the surface of the wheel. This unique feature reduces the time required for setting to any given angle, and the tables remain rigidly fixed in the desired position until re-adjusted. A gauge indicates the angle at a glance, without the use of protractors.



The motors are reversible, so that either right or left hand tools can be ground with the wheel rotating toward the cutting edge, and a brake is provided to stop the machine when it is desired to change the direction of rotation.

A coolant-feeding device is provided for supplying the diamond wheels with oil or water. Either the resinoid or the new metal bonded diamond wheels can be used on either end of the machine, and another unique device permits either silicon carbide or diamond wheel to be adjusted along the shaft to compensate for wear and keep the face of the wheel as close to the edge of the table as desired. This permits grinding small tools and using the silicon carbide wheels right down to the metal plate on which they are mounted.

A combination tool-angle protractor and truing tool holder permits accurate grinding of tools and holds the diamond in the correct position for dressing the surface of the wheel.

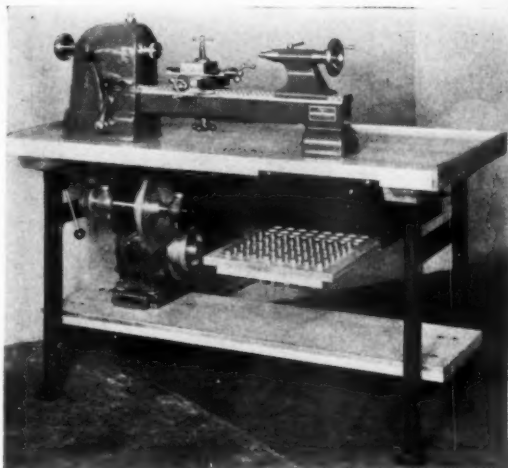
Thomas Prosser & Son of 120 Wall Street, New York, will supply the machines to responsible concerns on a trial basis, for tests under conditions in the shop of the user.

Elgin Offers New Bench Lathe Models

A new precision pre-loaded ball bearing bench lathe has been developed by Elgin Tool Works, Division of Hardinge Mfg. Co., 1772 Berteau at Ravenswood Ave., Chicago, Ill.

It is shown complete, mounted on an attractive and serviceable bench, a valuable feature of which is the handy provision for carrying a complete set of collets.

An interesting feature is the provision for quick and easy replacement of the endless V-belts. Removal of two bolts permits lifting off the belt cover and then it requires only a few minutes to install the new drive belts. It is



Severance
GROUND-
 Govern
 the World Of
ROTARY FILES
WHY?

Because Hand Cut or Mill Cut Rotary files will cut 75% faster and last five times longer on the same work after the teeth have been ground by Severance.

And, this grinding service costs less than the original Hand Cut or Mill Cut Rotary Files.

For further particulars write Dept. A.

Severance Tool Manufacturing Co.
 1310 East Genesee Ave. Saginaw, Mich.

TAG - O - GRAPH Tag and Label Addresser



Address 60 shipping tags or labels in one minute.—Insure against mistakes or lost packages. So simple—anyone can use it, yet as effective as machines costing 10 times as much. Send for complete description and prices.

Weber Addressing Machine Co.
 537 S. Dearborn St. Chicago, Ill.

unnecessary to remove or disturb the spindle or any of its parts—no removal of the headstock itself or the jackshaft.



The spindle is of high grade thorough hardening steel (SAE - 52100) ground internally and externally, including spindle nose threads. It is of a very rigid design having an extra large outside diameter.

CHECK MICROMETERS with ULTRA-CHEX

Many plants are distributing their large orders among smaller shops. Don't risk rejections. Equip your shop with ULTRA-CHEX (accurate to 8 millionths) and regularly check every micrometer your men use.

Request Bulletin 135.



NINE STANDARDS IN SET

.0625" - .100" - .125" - .200" -
.250" - .300" - .500" - 1" - 2"

Price with Optical Flat \$25.00

Price without Flat \$19.50

GEORGE SCHERR COMPANY, INC.
122 Lafayette Street, 3-4 New York

Super precision duplex preloaded ball bearings are used, front and rear, assuring positive metal-to-metal contact, with no end or radial play. No provision is made for adjustment of bearings because none is required.

Lathes are offered in $\frac{1}{2}$ ", $\frac{3}{4}$ " and one-inch collet capacities, 7" and 9" swing.

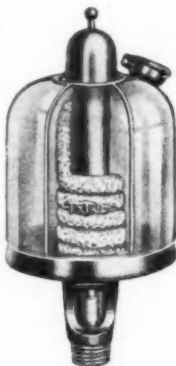
Speed control levers are conveniently placed on front of headstock housing.

There are many other detail refinements and improvements.

Trico Wick Feed Oilers

A new, visible, unbreakable wick feed oiler is announced by the Trico Fuse Mfg. Co., 2948 No. 5th St., Milwaukee.

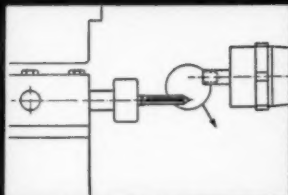
It is intended for economical use on machinery which operates intermittently. Lever at top, when in a vertical position starts the feed and when "flipped" to the side shuts it off. Oil supply is always visible.



When oiler is filled above the point where wick enters the center tube, surplus oil drains into the bearings, flushing them.

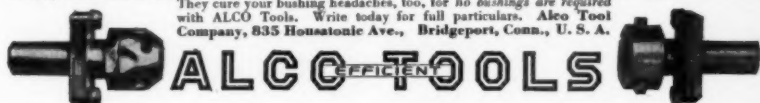
The oiler is light in weight and there are no gaskets to leak as the bottle is cemented and roll-clinched to the heavy brass base. All metal parts are bright cadmium-plated. Shut-off lever is hidden by the streamlined dome. The dust-proof, self-closing filler cap has an extended lip on the cover so that it can be easily raised with the spout of the oil can. The wick is wire reinforced for rigidity. The drip spout extends deep into the sight feed fitting for ready visibility. Made in three styles:—in one, two, and four ounce capacities. Complete descriptive folder is available.

*Accurate alignment reduces tap breakage
— especially in small
hole tapping*



Most broken taps are caused by imperfect alignment, as shown in exaggerated diagram. Even slight wear of the spindle causes many broken taps. Equip your screw machines with ALCO Tools and you'll overcome this difficulty. The exclusive floating feature makes absolute concentricity easily attainable. Adjustment is simple yet positive, on old or new machines.

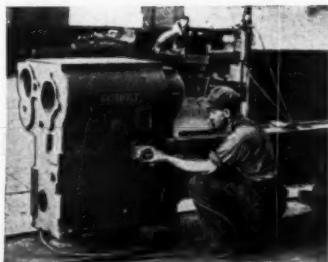
They cure your bushing headaches, too, for no bushings are required with ALCO Tools. Write today for full particulars. ALCO Tool Company, 835 Housatonic Ave., Bridgeport, Conn., U. S. A.



Your Sanding Can Be Done Better, Faster, and More Profitably with a **STERLING** *Speed-Bloc* **SANDER**

**Pays for
itself in
3 months**

Distribuidores
en las Ciudades
Principales
de Sud-America



The Sterling is found in all the modern plants in the country because it brings such worthwhile savings in labor and material costs — up to 75%. It produces better work in much less time.

Pays for itself in 3 months

Works on flat and curved surfaces (wet or dry). Used on metal, wood, or composition materials.

Ask for demonstration



STERLING PRODUCTS CO.

2459 Woodward Ave. Detroit, Mich.
3380 Robertson Blvd. Los Angeles, Calif.
204 E. King St., Toronto, Ont.

Despatch Tempering - Drawing Furnace

Here's a new furnace recently supplied to the Continental Machine Co., Minneapolis.

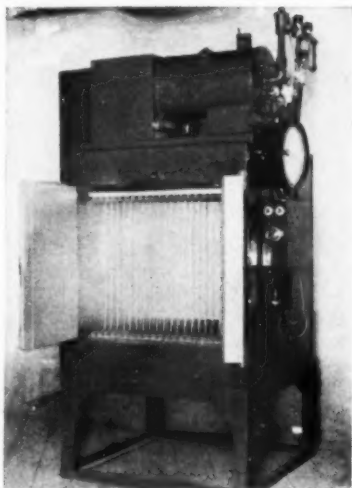
It is to be used for tempering and drawing band saw blades which are wrapped in coils and rolled into the furnace in an upright position.

The framework used to hold the coils is removable and the furnace may be used for any other tempering and drawing work.

This furnace was provided with wide swinging doors with special heat seal arrangement and compression type latches, approved by the Fire Underwriters. If lift doors are desired, they may be provided on this type of furnace.

This furnace shown is 35" wide, 30" high and 30" deep. Larger or smaller units can be supplied.

An important feature is the Despatch controlled combustion air heater,



ELGIN TOOLS

EFFICIENT-ECONOMICAL
MANY EXCLUSIVE FEATURES



NEW ELECTRIC BRAZING AND WELDING TORCH—Quick release of carbons from holders by remote control (no need of interrupting work) . . . arc contact and breaking arrangement is operated by thumb levers . . . complete with 10 feet of cable, plug-in connection, set of carbons. Use on all types of welders, A. C. or D. C.

ELECTRIC ARC WELDER—Ease in striking and maintaining a flexible and obedient arc makes it possible for even the most inexperienced operator to make a strong weld in less time . . . instant switching to various heats . . . three models, 150 to 250 amps.

PNEUMATIC UTILITY HAMMER—Ideal for cutting light gauge metals, weld-peening and flux-scaling, chipping on dies, molds, etc. Complete assortment of tools assures widest range of work.



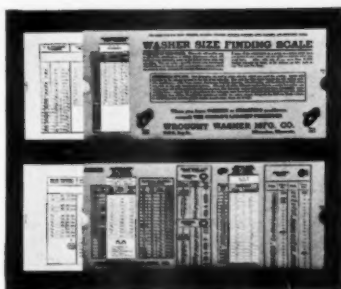
BORM MFG. CO.
ELGIN, ILLINOIS Send for Catalog Today

mounted at the top, with a high-temperature, high-capacity fan to supply heat to the furnace. Air is forced into the ducts at the bottom of the furnace and the recirculating ducts are located at the top. Air travel is vertical and by using a large capacity fan, uniformity within three to five degrees F., plus or minus is said to be obtained, along with a very rapid heat transfer.

Further details may be obtained from Despatch Oven Co., Minneapolis, Minn.

Washer Size Finding Scale

Have you ever attempted to select a washer for a given bolt or screw size from several different washer classifications — trying to compare a half dozen listings by keeping them all in mind and in view at the same time? If you have, you will appreciate the handy convenience of a new washer size finding scale announced by the Wrought Washer Mfg. Co., 2100 S. Bay St., Milwaukee, Wis.



This time-saving device, which will be sent without charge to rated firms, enables a speedy comparison of the complete range of washer specifications available for an individual size requirement in each of the several standard and semi-standard washer classifications. This makes possible the prompt selection of a washer whose dimensions will best answer a specific design or assembly problem.

AMERICAN BONDED PRE-FINISHED METAL



Cut costs! Eliminate plating, polishing and lacquering operations with American Bonded Pre-finished Metals. Over fourteen different metals—in sheets, coils and round edge flat wire. To prove the economy of pre-finished metal in your own plant, let us provide—free of charge or obligation—enough of the pre-finished metal of your choice for a conclusive test. Write for complete details.



A COMPLETE LINE

CHROME ZINC	BRASS STEEL
NICKEL ZINC	CHROME BRASS
COPPER ZINC	NICKEL BRASS
BRASS ZINC	CHROME COPPER
CHROME STEEL	NICKEL ALUMINUM
NICKEL STEEL	CHROME ALUMINUM

Bright or Satin finishes Stripes, Crimpings, Corrugations.

FOR MORE
BEAUTIFUL
PRODUCTS AT
LOW COST



AMERICAN NICKELOID CO.
*For World's Finest
Pre-finished Metals*
1311 Second Street, PERU, ILL.

WRITE FOR FREE "TEST KIT" OF PRE-FINISHED METAL

The Mail Bag

A Monthly "Clearing House" for readers' problems and requirements. Excerpts from some of the many letters received, are published to reveal trends and activity in the industry. Comments, recommendations and inquiries offered by readers, will be forwarded to the writers of these letters. Answers that are of general interest will be published.

—29—

A Midwestern manufacturer requires a graduating machine for putting divisions on work up to 36" diameter.

—30—

A method is sought for removing scale from small steel parts. The parts in question are small hardened steel cylinders, 7/32" in diameter. A hole about .042" serves for a bearing and the problem is to prevent or remove scale from the interior.

—31—

A polishing machine is required for round stainless steel wire, .100" in diameter—also for 5/16" diameter brass tubing in two foot lengths.

—32—

A reader who neglected to give his home city, requests information on small electrical clutches for 1/4 and 1/3 h. p. motors. He can probably obtain the desired information by writing Cutler-Hammer, Inc., and Stearns Magnetic Mfg. Co., addressing both at Milwaukee, Wis.

—33—

Information is wanted on a crank-pin turning machine that can be used on ammonia compressors, oil and gas engines, with two or more throws on crankshaft — dressing up the crankshafts without removal from the engines.

—34—

A Western manufacturer is interested in obtaining equipment for the fabrication of non-returnable 55 gallon steel drums. Requirements would not exceed 200 drums a day so very expensive or complicated equipment would hardly be required.

—35—

A grinder for finishing rubber rolls, about 7" long and 3/4" in diameter is required, by manufacturer of office equipment. Machine should be about the size of a bench lathe.

Universal Bender for Bench Use

A sturdy, readily portable bender for job or production use is offered by O'Neil-Irwin Mfg. Co., 316 Eighth Ave., Minneapolis, Minn.

It is a sturdy, durable tool with all service parts of hardened steel. Working parts are easily replaceable from stock material. While easily adaptable to special jobs, it is designed to handle the average shop requirements with a minimum of set-up cost.



It forms round and flat wire, rod, tube and strip stock — bends loops, eyes, hooks, springs and corners any radius to 3". The clevis automatically adjusts itself to the material size. The makers emphasize that setups are readily changed from one job to another and back to the original with assurance of accuracy.

New Trade Literature

1—HYDRAULIC CYLINDERS

A new bulletin, No. 35-B illustrates and describes the line of hydraulic cylinders offered by Hannifin Mfg. Co., 621 So. Kolmar Ave., Chicago. Included are the new BN and B2N cylinders with swivel mountings.

2—CONTROL VALVES

Lever, Foot, Solenoid and Motor Operated three and four-way valves for use in operating air, water, steam and oil, single and double acting cylinders are covered in Catalog No. 140, issued by W. H. Nicholson & Co., 117 Oregon St., Wilkes-Barre, Pa.

3—LEWIS IRON

A new bulletin on Lewis Iron by Jos. T. Ryerson & Co., Chicago, describes Lewis special staybolt iron, Lewis solid staybolts and Lewis U. S. Navy chain iron. Applications, physical properties, sizes and shapes available and other pertinent data is given.

4—DIVIDING HEADS

The new line of Dividing Heads offered by L.W. Chuck Co. 1-7 N. St. Clair St., Toledo, O., is described in detail.

5—PORTABLE TOOLS

Catalog 41 gives detailed information and photos on the complete line of tools offered by Skilsaw, Inc., 5035 Elston Ave., Chicago. The line includes saws, drills, abrasive discs, saw blades, sanders, grinders, blowers, etc.

6—SPINDLE BEARINGS

Two new broadsides illustrate in blueprint style, successful machine tool spindles mounted in ball bearings made by Marlin-Rockwell Corp., Jamestown, N.Y.

7—ABRASIVE TESTING

A new booklet published by Foster Machine Co., Elkhart, Ind., describes their new method of testing the bond hardness of fine grit abrasives.

8—ELECTRIC HOISTS

A couple of attractive new bulletins cover the Titan line of electric hoists made by Detroit Hoist & Machine Co., 8201 Morrow St., Detroit, Mich.

9—BRAZED AND WELDED TIP TOOLS

Two new folders by Fansteel Metallurgical Corp., North Chicago, Ill., cover Tantung brazed and Tantung welded tip tools for cutting steel. Methods of application are given with explicit instructions.

10—R-P MACHINE TOOLS

A new bulletin presents the line of lathes, vertical millers, duplicators, die casting and molding machines, die sinkers and profilars made by Reed-Prentice Corp., Worcester, Mass.

11—DIE AND TRUFORM STEELS

Two new booklets by Jessop Steel Co., Washington, Pa., give detailed information on die steels and Truform oil hardening non-shrinkable alloy tool steel.

12—WHY ANTI-FRICTION BEARINGS

A 112 page book, A-266 published by New Departure, Division General Motors Sales Corp., Bristol, Conn., discusses the fundamental reasons for the increased use of modern rolling bearings. It is a veritable ball bearing handbook.

13—WELDON TOOLS

The full line of end mills, cut-off tools, die sinking cutters, adapters, holders, shell end mills, jig borer end mills, T-slot cutters, etc., made by The Weldon Tool Co., Cleveland, O., is covered by Catalog No. 8.

14—GAS APPLIANCES

Johnson Gas Appliance Co., 524 E. Ave., N. W., Cedar Rapids, Iowa offer a complete line of ring burners, pipe burners, Bunsen burners, torches, melting pot furnaces, melting and pot-hardening furnaces, high speed heat treating furnaces and the new Johnson automatic electric ignition conversion burner. These are all covered in a new catalog.

15—V-BELT DRIVE DESIGN

Catalog 2180 of the B. F. Goodrich Co., Akron, Ohio, devotes 24-pages to the problem of selecting V-drives. There are nine important steps which are explained simply and clearly and in non-technical language.

16—TAPS

"Dr. Bath, Specialist in Tapping Diseases" is another excellent example of the effective use of humor in driving home sales points. With original sketches which will cause many a chuckle, the misuses and mishaps of taps are depicted in ways that will be remembered and tied in with the line of John Bath & Co., Worcester, Mass.

Kindly have manufacturers send us the catalogs we have checked above.

Name Title.....

Firm Name

Street

City State.....

Attach to your letterhead and mail to Hitchcock Publishing Co., 508 S. Dearborn St., Chicago, Ill.

Eisler Universal Machine No. 310

Eisler has recently developed a Universal spot welding machine known as the Universal Welder No. 310. It is similar to a standard 10 KVA spot welder with sliding horns and especially adaptable for all kinds of sheet metal work.

The following features are embodied: 1. Conventional type spot welding machine, foot operated. 2. A. C. transformer type arc welding machine. 3. Hand operated push spot welder. 4. Air operated gun welder.

It can also be air operated and the equipment is made for 25 — 40 — 50 — 60 cycles, 220, 440 or any other voltage.

In a sheet metal shop where various operations of this type are performed, these units are very useful.

It can be supplied with individual controls so that each operation may be performed without interfering with the other.

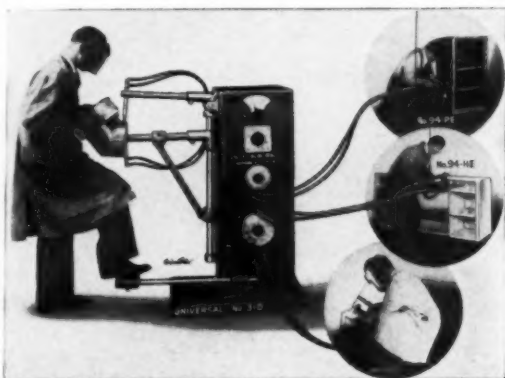
This arrangement is made with a spot welder of 10, 20, 35 or 50 KVA, 200—300 — 400 Amp. Arc Welder.

If more information is desired, write to Eisler Engineering Co., 762 S. 13th St., Newark, N. J.

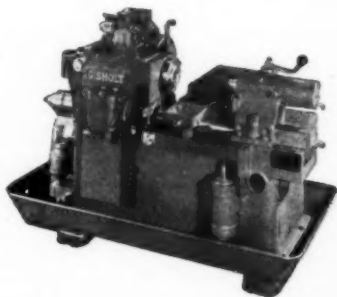
Gisholt No. 12 Hydraulic Automatic Lathe

A new hydraulic automatic lathe for between centers and chucking is announced by Gisholt. Known as the Number 12, this machine finds wide application on production turning jobs such as gear blanks, cylinder-liners and pistons, small impellers and flywheels, etc.

It provides for a swing of 16- $\frac{3}{4}$ " over the bed or 12" over the front carriage, with a length between centers of 22".



Features include a simplified hydraulic control system which permits handling of all functions of the machine by means of a single lever. The front carriage, as well as the rear slide, has independent hydraulic feed. Machine is equipped with hydraulically operated main clutch and an automatic spindle brake.



Details of the machine as well as many typical installation jobs are shown in a new illustrated folder, Form 1080, copies of which are obtainable from the Gisholt Machine Co., 1257 East Washington Ave., Madison, Wis.

Classified Section

USED AND REBUILT MACHINERY

Lists of Used and Rebuilt Machinery, either For Sale, Wanted, or For Exchange, set in uniform style, will be published in the Classified Section at the rate of \$5.00 for your name and address and a five line advertisement. For additional lines, 40c per line.

Write directly to those offering the machine for sale, for prices and full descriptions. If what you seek is not advertised, write Hitchcock Publishing Company, Chicago, making known your wants on either new or used machinery and the publisher will gladly pass them along to the advertisers.

FOR SALE BY

**Aaron Machinery Co.,
176 Lafayette St., New York, N. Y.**

Automatic screw mchs. Brown & Sharpe, No. 0, No. 2.
Drills, high speed 2, 3, 4, spdl., Allen, Leland-Gifford.
Gap lathe 24"-48"x16" Rahn-Larmon ext.
Grinder, P. & W. 14" vertical surface, ball bearing.
Miller, No. 3 Cleveland plain, s. p. d.
Miller, No. 3 Conradson Ryerson plain, s. p. d.
Milling machines, Kemnith universal, Nos. 1, 2, 3.
Radial drill, 3' Morris, s. p. d.
Radial drill, 4' Mueller, s. p. d.
Turret lathes, Warner & Swasey Nos. 2, 4, 6.
Hydraulic presses, pumps, accumulators.

Russell Machine Co.

438 Oliver Bldg. Pittsburgh, Pa.

Boring mill, 42" Gisholt, 2 heads., m. d.
Boring mill, 19" Niles vertical.
Gear hobber, No. 18H Gould & Eberhardt, s. p. d.
Hammer, 5000 lb. double frame NBP steam.
48" Morton Keyway cutter, cap. 3 1/2" wide.
Lathe, 26"x13" Chard, hvy. duty, q. c. g., t. a.
Lathe, 52"x23" Pond triple geared.
Lathe, turret, No. 3-A Warner & Swasey.
Pipe cutting and threading machine 6" Merrill.
Planer, Cincinnati 36"x36"x16" table.
Planer, open side 48"x48"x12" D. & H., 3 hds., m. d.
Press, wheel, 200-ton Niles, b. d.
Press, No. 83 Cleveland, str. 2 1/2", roller feed, m. d.
Shaper, 24" Gould & Eberhardt.
Shaper, 24" Columbia, d. b. g., gear box, m. d.
Shear, plate, No. 5 H. & J., cap. 90"x1", m. d.
Shear, Alligator, No. 61 Carlin high knife, 2 1/2" sq.
Upsetting machines, 2 1/2, 3 1/2 and 8" Ajax iron bed.

Siegmund Machinery Co., Inc.

563 W. Washington Blvd., Chicago, Ill.

Automatics, Gridleys 1 1/2 and 4.
Die sinker, Billings & Spencer, rotary table, g. b. d.
Gear hobbors, Barber Colman No. 12, (8).
Grinder, tool and cutter, Norton univ., motor in base, complete equipment.
Grinder, Landis No. 2 universal.
Hob grinder, Harris.
Hydraulic presses, 200 ton, complete with pumps.
Lathe, Hendey, 30"x16", q. c., taper att.
Press, punch, No. 2 Bliss Cons., b. g., m. d., 7 1/2 h. p.
Shaper, 21", Milwaukee, V-ways.
Swager, No. 3 1/2 Langelier.

FOR SALE BY

**Globe Machinery Company
602 W. Lake St. Chicago, Ill.**

Boring mill, 34" Beaman & Smith, horizontal, s. p. d.
Lathe, Bridgeford, 26"x12" heavy duty, quick change.
Lathe, 48" gap, Harrington, 15" between centers with 6" raising blocks.
Pipe threader, Cox 2 1/2 to 8" cap., motor drive.
Radial drill, Mueller 4", m. d. with tapping att.
Wire straightener, Wells, capacity 1/2, 3/16, 1/8.

**Rosenkranz, Weisbecker & Company, Inc.
2308 Singer Building, New York, N. Y.**

Boring mills, 60" Betts vertical, motor drive.
Gear cutter, 110" Newton, motor drive.
Grinder, Cincinnati 24", face mill, motor drive.
Grinder, 30"x168" Landis, cylindrical, m. d.
Keyseater, No. 20 Catlin, m. d.
Lathe, 60"x35" Gleason, motor drive.
48"-60"x40" N-B-P geared head, m. d., P. R. T.
Lathe, 42"x18" Pittsburgh, quick change gear.
Miller, 24"x24"x12" Ingersoll, adj. rail, m. d.
Millers, 2 Ingersoll hor. facing mills, 9" spdl., m. d.
Miller, P. & H. vertical open end, keyseat, m. d.
Planers, 48"x16", 42"x20", 30"x16" Gray, 4 heads.
Slotter, 18" Niles, vertical, m. d.

E. L. Klauber Machinery Co.

3221 Olive St. - - St. Louis, Mo.

Automatic beading & flanging machine, for small cans.
Lathes, 14", 16", 18" Monarch, Bradford, Lehmann.
Press, No. 35 Swaine o. b. i.
Turret lathes, No. 2 Warner & Swasey, No. 4 B. & O.
Saw, band, cut-off, No. 2 Klemm, motor drive.

The Reeve-Fritts Company

28 N. Clinton St., Chicago

Boring machine, No. 1 Barrett, cylinder.
Gear hobber, No. 1 Adams Farwell.
Lathe, 10"x3" Star-2 chucks.
Lathe, 22"x14" Davenport, q. c. g.
Saw, cold, Lea-Simplex, 54".
Screw driver, No. 2 Reynolds.
Screw machine, 3" Cleveland automatic "A".
Screw machine, 1 1/2" Cleveland automatic "A".
Tapper, No. 1 Garvin, 1/2" vertical.
Turret lathe, 19" P. & W., geared head.

USED AND REBUILT MACHINERY

FOR SALE BY

Industrial Machinery Company, Inc.
2200-2300 Fletcher Av. Indianapolis, Ind.
 Turret lathe, No. 2 Acme full universal, m. d. 3-60-220.

Alex Zeev

2280 Woolworth Bldg., New York, N. Y.
 Hammer, power, 400 lb. Beaudry "Champion".
 Keyseater, No. 1 Baker, fully equipped.
 Lathes, engine, 27"x24" Lodge & Davis, l. c. g.: 17"x8"
 Kyerson-Conradson 12-speed geared head, taper;
 16"x6" Walcott 12-speed geared head; others.
 Planers, 36"x36"x10' Pond, 4 heads; 30"x30"x10' Niles,
 2 heads.
 Shapers, 25" Smith & Mills, 20" Smith & Mills (clutch
 in driveshaft), 20" Whipp, all b. g. and cone drive.

FOR SALE BY

B. D. Brooks Co., Inc.
119 Broad St. Boston, Mass.

Sheet metal working machinery, hand and power.
 All types of new and reconditioned equipment.
 Apron brakes, press brakes, shears, folders,
 Bending rolls, corrugating rolls, forming rolls,
 Punches, bead rollers, rotary machines, stakes, etc.

Bleser Machinery Company

209 N. Sixteenth St., - Springfield, Ill.
 Angle shear, 3"x3" angles, 14" round or punch... \$ 225
 Lathe, 22"x8" Perkins, taper attach. 250
 Lathe, 36"x18" L. & S., q. c., arranged m. d. 1500
 Shaper, 16" American, arranged motor drive 385
 Trip hammer, 260 lb. Champion 250

Marr-Galbreath Machinery Company

Air compressor, 7x6" Penna., belt.
 Air compressor, 9x8" & 14x12" Ing-Rand.
 Ball or jar mill, 2-jars 10x13", belt or m. d.
 Blowers, (furnace) No. 2 Knight; No. 3 American.
 Blower, pressure, No. 11-PB Am. 14375 cfm., m. d.
 Bolt cutter, 14" Landis, sgl. head.
 Boring mill, 30" Bullard vert., threading attach., b. d.
 Boring mill, 54" Pond, 2-hds. Fctn. feed, c/s.
 Brake, 6"x16" PS & W. hand
 Brake, 8"x12" ga. Chicago, power, belted.
 Brake, crimp and corrugating, 10"x16" ga. Keene.
 Driller, horiz., 6 spindle Nat'l. Acme, No. 2 chucks.
 Drill, radial, 5" Western, prt., m. d.
 Drills, gang, 3 and 4 spindle, 1 to 4 MT.
 Exhauster, No. 35 Buffalo, outlet 12x14", m. d.
 Fan, ventilating, 24" American, m. d., 1/40.
 Fan, 24 Sirocco, 4960 cfm. 4" wp., m. d.
 Forging machine, 14" Acme, all steel, side shear.
 Furnace, T-J., 25x23x12" J.D. 17900 f.
 Gear pinion, No. 3 Sloan & Chase, apto. bench.
 Grinder, No. 21 Landis, plain, 10x30", c. s.
 Grinder, portable surface, No. 6-OA, motor, 3/60.
 Grinder, surface, 36x24" Diamond, hydr. feed, m. d.
 Grinder, univ. C. & R. No. 2 B. & S.
 Grinding spindle, Excebo No. 39, bracket 5002.
 Hack saws, No. 2 & 4 Economy, belted.
 Hack saws, No. 7 & 14 Atkins, belted.
 Hammers, 50 lb. Boss, No. 2, with dies, belted.
 Hammer, 100 lb. Little Giant, belted.
 Hammer, 200 lb. Bradley upright helve, motor drive.
 Hammer, 400 lb. Beaudry "Champion", b. d.
 Hammer, 400 lb. Bliss board cap (rebuild).
 Hammer, 1000 lb. Chbg. steam drop, double frame.
 Hoists, 10-ton Euclid, 3/60/220 (2).
 Keyseater, No. 2 M. & M., cap. 14"x12" belt.
 Keyseater, Morton, cap. 24"x24", s. p. d.
 Lathe, No. 4 Rivett, bench, draw-in-att.
 Lathe, 10"x8" Champion, cone.
 Lathe, 11/16"x4" Artisan, q. c. g., s. p. d.
 Lathe, 12/14"x6" Stay cone (toolroom equip.).
 Lathe, 15/22"x8" Sebastian hand bed cone.
 Lathe, 18"x6" National, q. c. g., d. b. g., chuck.
 Lathe, 18"x10" South Bend, plain change.
 Lathe, 20"x12" American geared head, m. d. (old)
 Lathe, 22"x12" Rahn-Larmon, pl. change gears, t. a.
 Lathe, 24"x20" L. & S. selective head, m. d., t. a.
 Lathe, 26"x10" Wolcott, q. c. g., d. b. g., 24" h. s.
 Lathe, 27"x10" L. & S., 5-step cone, q. c. g.
 Marking machine, No. 3 Noble & Westbrook.
 Miller, No. 2 Ciro. univ., (old model), cone.
 Miller, hand, No. 2 Kempstith.
 Milling machine, univ. No. 4 B. & S. cone.
 Motors, 15 h. p., West, 3/60/220-440/870 rev.
 Motors, 25 h. p., Allis-Chalmers 3/60/220/680 rev.
 Motors, 30 & 40 h. p., West, CS 3/60/220/870 rev.

57 Water St.,

Pittsburgh, Pa.

Nailing machine, No. 6 Morgan, 8-track, m. d.
 Nibbling machine, No. 1 Campbell, 6" thr 3/16".
 Pinion cutter, No. 3 Sloan & Chase, capacity 1x1".
 Pipe machine, 4 to 3" Jarecki, belted.
 Pipe machine, 4" Williams, cap. 4" to 4", m. d.
 Pipe machine, 8" Williams "Rapidity", m. d.
 Pipe machine, 6" Landis, m. d.
 Pipe machine, 6" Landis "Lanco", m. d.
 Pipe machine, 18" Winland "Standard", m. d.
 Planer, 26"x26"x8' Niles, 1 hd., belt m. d.
 Press, hyd. vert., 30-ton Laurie, 18" between posts.
 Press, foot, Lewthwaite, wt. 400 lb., (2).
 Press, horn, No. 164 Bliss, plain, stroke 14".
 Press, OBI, No. 4 L-J., 3" stroke, plain.
 Press, O. B. I. 18 Bliss, 14" & 2" stroke (2).
 Press, O. B. I. 21 Bliss, 1" stroke, m. d. (2) cheap.
 Press, o. b. No. 3 Perkins, pl. str., 14".
 Press, o. b. i. No. 1 Thomas, 2" stroke, m. d.
 Press, punch, P-2, Ferracite, m. d. (overhang brg.)
 Press, punch type, equal 54 Bliss, 10,000 lb.
 Press, 10-3 Minster, horn, adj., swing table (new).
 Press, sgl. crank, 594 Toledo, str. 8".
 Press, wheel, 200-ton, 93"x16", pump, m. d.
 Punch & shr., comb., No. 5 Buffalo, hand, cap. 4"x4".
 Punch & shear, S. E., 15" ht., 4"x8" No. 3 L. & A.
 Punch & shear, S. E., 6" th., No. 3 L. & A., rapid a.
 Riveter, No. 5-A, high speed, cap. 4", m. d.
 Riveter, 103 & 120 Grant, m. d.
 Rolls, 20"x6" United, 2-rolls (for leather).
 Saws, metal, 4x4" Napier, m. d., (2).
 Saw, shaping, 6x6" Peerless, motor 3/60.
 Screw mach., No. 6 Foster, 24" bar cap. c/s.
 Shaper, 16" Blount, (planer drive).
 Shaper, 16" G. & E. motor 3/60/220, (old).
 Shaper, 21" Averbeck, b. g., cone.
 Shaper, 24" Milwaukee b. g., V-rim.
 Shaper, 28" American b. g., gear box, m. d.
 Shear, bar, No. 3 United, 24" blade, cap. 24" sq., m. d.
 Shear, Blocks & Blades 82"x4" cap. 1500 lb.
 Shear, B-36 Stanley Unishar, cap. 4", m. d.
 Shear, O-36 Stanley Unishar, cap. 14", m. d.
 Sprue cutter, No. 172 Bliss, belt.
 Tapping machine, 4" Pratt & Whitney, b. d.
 Testing machine, 1000 lb. Olsen hyd., hand.
 Testing machine, 100,000 lb. Riehle, m. d.
 Tearing machines, 600 and 1000 lb. Economy, hand.
 Tractographs, Aircro No. 1, (4).
 Transmission, Reeves No. 00, (new)
 Tumbling barrel, No. 2 Baird, tilting.
 Turbines, 100 h. p. Westinghouse, 900 rev.
 Turret lathe, 34"x36" Acme, s. p. d.
 Turret lathe, 18"x26" Springfield, Fox Monitor.
 Turret lathe, No. 6 Foster, 2-1/16" H. S. W-F., cone.
 Upsetter, 18" Acme, all steel.
 Welder, arc, 250 amp., a. c. Hampton (new).

USED AND REBUILT MACHINERY

FOR SALE BY

D. E. Dony Machinery Co.
47 Laurelton Rd., - Rochester, N. Y.

Bumping hammer, No. 2 Pettingell.
 Drill, No. 2 Colburn.
 Grinder, No. 1 Cincinnati tool and cutter.
 Shaper, 16" Smith & Mills.
 Shaper, 18" Steptoe, m. d.

Wiener Machinery Co., Inc.
237 Centre Street New York, N. Y.

Lathe, 27", will swing 30"x25", Lodge & Shipley, 12 speed, selective geared head, motor drive, taper attachment.
 Lathe, 42"x39" American geared head, motor drive, triple geared, 16 speeds, taper attachment.

Standard Machinery Co.,
347 Indiana Ave. Grand Rapids, Mich.

Automatic, No. 453 New Britain.
 Boring mill, 24" Lucas horizontal.
 Boring mill, 34" Colburn vertical.
 Chucks, magnetic chucks—various sizes.
 Drill grinder, Sellers 3" capacity.
 Grinder, No. 4 Hadger disc, motor driven.
 Lathes, Porter-Cable Mig. (6).
 Miller, model C-1 Becker heavy vertical.
 Radial drill, Western, 4' arm.
 Shaper, 24" Hamilton.
 Shear, No. 13 Pettingell rotary, m. d.

Joseph Hyman & Sons,
Tioga and Almond Sts., Philadelphia, Pa.

WORLD'S LARGEST STOCK
POWER PRESSES

No. 206C Toledo, gap, dbl. crank, tie rod, 64"—7" crank.
 No. 94D Toledo, dbl. crank, 54", stroke 8", crank, 6", with air cushions.
 No. 6C Bliss, double crank, tie rod, 60", crank 6"—64", with air cushions.
 No. 3A Bliss, double crank, tie rod, 36", stroke 12", crank 4"—44".
 No. 710H Niagara, double crank, 36", shaft 64"—7".
 Nos. 92D, 91C, Toledo dbl. crank presses.
 Nos. 54, 55, 57, 59D Toledo, geared straight side.
 No. 305 Bliss, tie rod, geared, 6" stroke.
 No. 55A Toledo, geared, straight side.
 No. 512 Niagara, geared, straight side, 84" shaft.
 No. 53G Garrison, tie rod, straight side, 9" crank.
 Nos. 55S, & 54C tie rod Bliss toggle presses.
 No. 341H Bliss toggle presses, (2).
 No. 1482 Toledo toggle, tie rod.
 No. 1442 Toledo and No. 5 Bliss toggle presses.
 No. 910B Stoll, toggle press, 7" crank, 84" draw.
 No. 40 & 39B Bliss, Nos. 14 & 13 Toledo boring.
 No. 662 Toledo, 250 ton knuckle joint, coining.
 150 ton No. 5WG 52" Ferracute, 75 ton EG 57" Ferracute.
 500 ton American Can Coining, 75t. No. E31 Ferracute.
 200 ton No. 59 Bliss, 250 ton Waterbury F. coining.
 100 ton No. 21 Bliss, 50 ton No. 3 Bliss coining.
 No. 3 Bliss wiring presses, (2).
 Bliss roll forming machine, 8 pairs rolls for stock up to 25" wide, 4" bearings, weight 25,000 lbs.
 Squaring shears, various makes.
 Gang slitter, 60", Braddock, type H.
 These and hundreds of others of popular makes and sizes, are in stock at our warehouse here.
 Rebuilt and Guaranteed.

FOR SALE BY

C. R. Daniels
1514 W. Capitol Drive, Milwaukee, Wis.

Apron brake, 4', 4" capacity, m. d.
 Drill, 1 Colburn No. 3 manufacturing, 4 spindle.
 Lathe, 18x10 Ryerson, geared head.
 Hammers, 50 lb. and 100 lb. Bradley belv. (2)
 Plater, 550 gal. capacity, Richards rotary.

Reliance Machinery Sales Company
1405 Brighton Place, N.S. Pittsburgh, Pa.

Air compressor, 7x6 Ing.-Rand, 92 cu. ft.
 Air compressor, 8x8 Chicago, 139 cu. ft.
 Air compressor, 12x14 Worthington, 450 cu. ft.
 Borer, car wheel, for 12" wheels.
 Boring mill, 51" Bausch, 2 heads, rapid traverse.
 Bulldozer, No. 9 W. W., 24" stroke, crosshead 16x59 1/2".
 Grinder, No. 2 Brown & Sharpe surface, motor drive.
 Miller, No. 4 Cincinnati, plain, cone.
 Miller, No. 5 H. & S., plain, table 16"x54", cone.
 Miller, No. 6 Becker, 63" feed.
 Planer, 36"x36"x12" Cincinnati, 2 heads.
 Press, consolidated, s. s., 5" shaft, 64" stroke.
 Press, No. 82-C Toledo dbl. crank, 5" shaft, 44" wide.
 Press, No. 94-A Toledo dbl. crank, 6" shaft, 6" stroke, 40" wide.
 Roller leveler, 54", 17—44" rolls, m. d.
 Shapers, 16", 20" and 24", various makes.
 Slotter, 15" Bement, crank, 36" rot. table.

What do you need? What have you for sale?

Jones Machine Tool Company
Front & Pike Sts., Cincinnati, Ohio

LATHES

38x12' Boye & E. q. c.
 36x14' Boye & E. q. c.
 36x18' Fifield, cone drive.
 30x12' Putnam, cone dr.
 24x20' L.-S., cone drive.
 18x10' LeBlond, cone dr.

MILLERS & GRINDERS

No. 3 Kempa, plain, c. d.
 No. 2 Hvy. B.-S., pl., c. d.
 No. 3 Cinc. plain, c. d.
 No. 25 Hvy. Ohio, univ., cone drive.

PRESSES

No. 6-H Toledo, incl.
 No. 17 Stoll, inclinable.
 No. 5 Toledo, inclinable.
 Nos. 21, 21-S Bliss, incl.
 Mich. s. s. dbl. crank, 72"

SHEARS

No. 65 Nia, circle shear
 42" Pexto, foot sn. 16 ga.
 42" Power shear.
 48"x16 ga. Queen City.

MISCELLANEOUS

Boring mill, 42" King, 2 heads.
 Hack saws, Racine and Peerless.
 Radial, drill, 5" Fostick, s. p. drive.
 Shapers, 24" Cint., Gould & Eberhardt.
 Also 20 and 16" Ohio, Smith & Mills.
 Keyseater, No. 1 Baker.
 Pipe machine, 4" Landis.
 Also 6" Williams.
 Gear generator, 11" Gleason.
 Turret lathes, No. 6 W. & S. & No. 3 Foster.
 Screw machines, 24 and 14 Cleveland.
 Also 1 1/2 Gridley 4-spindle.

A LARGE STOCK ALWAYS ON HAND—
LET US HAVE YOUR INQUIRIES

USED AND REBUILT MACHINERY

FOR SALE BY

Davis Machinery Company
1-3-5 So. St. Clair St. Toledo, Ohio

Brake, 4'x3/16" Chicago, power, leaf type, m. d.
Drill, No. 2-II Edlund, 4 spdl., h. s., b. brg., m. d.
Lathe, 14"x6" Hendey, q. c. g., motor dr.
Milling machine, No. 3 Cin. univ., hi. p., div. hd.
Press, 50 ton H. & W., dieing machine, m. d.

L. L. Richards Machinery Co.
3804 N. Fraternity St., Milwaukee, Wis.

Brake, 5 ft. Chicago, box and pan,\$150
Drill press, 3 spindle Avey, 8" over, 450
Lathe, 16" x6" Sidney, g. h., m. d., 450
Milling machine, No. 1 Cincinnati universal, 700
Threading machine, Bridgeport automatic, 750

FOR SALE BY

Dexter Machine Products, Inc.
2895 W. Grand Blvd., - Detroit, Mich.

ACME AUTOMATIC
3" 4-spindle Model "B" Acme automatic machine, motor driven, \$2,500.00. This machine is in excellent working condition.

Ralph Hochman & Co.
54 Edison Place - Newark, N. J.

PRICED LOW FOR QUICK REMOVAL.
Boring mill, 42" Bullard, 2 swirl heads,\$1100
5A Potter & Johnston, automatic chuck, 300
5A Potter & Johnston (3), each, 375
Power press, 52 V & O geared, 5" stroke, 550
Machinery bought and sold.

Lang Machinery Company

28th St. & A. V. R. R.

Pittsburgh, Pa.

Air compressors, Ingersoll-Rand XB-2, 600, 885, 1200 & 1500 cu. ft. 100 lb. pressure, motor drive.
Air comp. 14"x12" Ing. Rand "EK-1", 464 c. f.
Bolt cutter, 1" Landis, 14" 3" Acme, sg. hd., b. d.
Bolt cutter, 1" Landis, triple head, m. d.
Bolt cutter, 14" Acme dbl. spindle, Landis heads b.d.
Bolt cutter, 24" Acme, Landis head, b. g. m. d.
Boring mill, 30" Bullard, threading attach., s. p. d.
Boring mill, 42" Bullard, 2 swirl heads, s. p. d.
Boring mill, 42" Gisholt, 2 hds., r. p. t., m. d.
Boring mill, 42" Colburn, grd. fds. 2 hds., s. p. d.
Boring mill, 52" N. B. P., r. p. t., m. d.
Boring mill, 52" Busch, geared feeds, d. c., m. d.
Boring mill, 62" Bullard, 2 heads, grd. feeds, m. d.
Boring mill, 72" Niles, 2 head, b. d.
Boring mill, 90" Betts, rapid traverse, m. d.
Boring mill, 10" Niles, 2 heads, belt drive.
Boring mill, floor type, 3" bar Niles, m. d.
Boring mill, hor., 48" bar Niles, .11 type, m. d.
Brakes, power, 8 1/2 ga. D. & K.
Buffer and polish, 7 1/2 ga. Marschke, 220/360.
Cranes, (2) 5-ton Shaw, KOT, 50' span, 3 mtr.
Drill, radial, 2' Mueller, t. a., rd. column, m. d.
Drills, upright, 14" to 32", belt drive.
Drill, No. 3 Avey, sg. spdl., 12" o. h., b. d.
Drill, upright 36" Snyder, p. f., b. d.
Drills, 4-spdl. Avey No. 4, b. b., m. d.
Gear cutter, 48" x12" Gould & Eberhardt, s. p. d.
Gear hobber, No. 15-H Gould & Eberhardt, s. p. d.
Gear hobber, 96" x30" Gould & Eberhardt, m. d.
Grinder, U. S. dbl. end, 7 1/2 h. p., 220/360.
Grinder, disc, 18" Diamond, dbl. end.
Grinder, surface, No. 5 Grand Rapids, hyd. feed, m. d.
Grinder, surf. Diamond, 24" x36", hydr. fd., m. d.
Grinder, universal No. 2 Landis, b. d.
Hammer, 30-lb. Bradley upright strap.
Hammer, 100-lb. Bradley cushion helve, belt drive.
Hammer, power, 300-lb. Bradley upright helve.
Hammers, steam drop, 1000-lb. to 8000-lbs.
Keyseaters, M. & M. No. 4-24", No. 5-34".
Keyseater, No. 2 Baker, str. 24", cap. 2", b. d.
Keyseater, Baker, 36" stroke, 34" m. d.
Lathe, 12"x6" Prentice, geared head, q. c. g., s. p. d.
Lathe, 14"x6" Rockford, q. c. g., d. b. g., b. d.
Lathe, 14"x8" Pratt & Whitney, p. c. g., t. a., b. d.
Lathe, 16"x8" Hendey, q. c. g., t. a., b. d.
Lathe, 18"x10" Hendey geared head, t. a., m. d.
Lathe, 20"x8" S.-B. & F., q. c. g., b. d.
Lathe, 20"x24" Lodge & Shipley, q. c. g., b. d.
Lathe, 21"x10" LeBlond auto. mfg., belt drive.
Lathe, 24"x10" Bradford, q. c. g., t. a., b. d.
Lathe, 24"x14" Schumacher & Boye, q. c. g., b. d.
Lathe, 24"x14" Lodge & Shipley, q. c. g., d. b. g., b. d.
Lathe, 24"x16" Lodge & Shipley, q. c. g., t. a., m. d.
Lathe, 25"x14" Schumacher & Boye, p. c. g., t. a., b. d.
Lathe, 36"x18" American, p. c. g., t. a., b. d.
Lathe, 36"x26" 6" New Haven, p. c. g., b. d.

Lathe, 36"x22" Sennmacher & Boye, p. c. g., b. d.
Lathe, 36"x32" L. & S. grd. hd., q. c. g., t. a., m. d.
Lathe, 51"x32" New Haven, triple geared, motor drive.
Lathe, turntable, F. & W., 24" x26", grd. hd.
Lathe, turret, No. 2 Warner & Swasey, b. d.
Lathe, turret No. 3-A W. & S., 42" h. s., s. p. d.
Lathe, universal No. 5 W. & S., ser. 350,000, m. d.
Miller, hand, No. 6 Whitney, b. d.
Miller, plain No. 0 B. & S., vert. head, b. d.
Miller, plain, No. 2 Cincinnati, tbl. 46-8" x10", b. d.
Miller, plain, No. 2 Hendey-Norton, b. d.
Miller, plain, No. 2 LeBlond, tbl. 52" x11-8", b. d.
Miller, plain No. 28 Ohio, table 52" x11-8", belt drive.
Miller, plain, No. 2 Cincinnati, b. d.
Miller, plain No. 4 LeBlond, table 72"x16", belt drive.
Miller, plain, No. 24 Brown & S. tbl. 80"x17-8" b. d.
Miller, thread, Hanson-Whitney, 6"x9", s. p. d.
Miller, No. 3-B Ivy, Brown & Sharpe, d. h., b. d.
Miller, vertical, No. 3-H Becker, m. d.
Miller, vertical No. 14-B Milwaukee, s. p. d.
Pipe machines, Landis 8" to 2", belt drive, (2).
Pipe machines, Nos. 304-B, 306 Oster, m. d.
Pipe machine, 6" Landis, gear box a. c. m. d.
Pipe machine, 8" Williams, 24" to 5" motor drive.
Pipe machine, No. 118 Merrill, 24" to 12", motor drive.
Planer, 30"x30"x8" Niles-Bement-Pond, belt drive.
Planers, 36"x36"x10" Cincinnati, 2 heads, belt drive.
Planer, open side, 45"x48"x12" D. & H. 3 hds., m. d.
Press, arch, No. 52 Toledo, str. 48", m. d.
Press, coining, ELG, 4 Ferracute.
Press, No. 95 Bliss, dbl. crk., str. 34", m. d.
Press, No. 83 Cleveland, stroke, 24", roller feed, m. d.
Press, toggle, No. 34-A Bliss, stand.
Presses, wheel, 100, 150 & 250-ton Hydraulic.
Profilers, Nos. E3 and E4, Keller, motor drive.
Punch & S., Cleveland, 36" thr., 14" -1", m. d.
Punch, lever, No. 52 Niagara, 36" throat, m. d.
Riveting hammer, No. 52-B high speed, m. d.
Roll, bending, 7"x4", Pyramid Type, b. d.
Saw, band Type JM Laidlaw, cap. 6", m. d.
Saw, shaping Peerless 6"x6", m. d.
Saws, hack 9"x9" Peerless & 8"x8" Atkins.
Shapers, 16", 20", 24" & 28", belt or motor drive.
Shaper, 24" Columbia, d. b. k., gear box, m. d.
Shaper, open side, 26" Universal, Type A, m. d.
Shears, alligator, Nos. 18 & 35 Carlin.
Shear, alligator, No. 61 Carlin, 3" round high knife.
Shear, Alligator, No. 7 United Eng. & Fdy. Co.
Shear, billet, No. FV-23 Pels, 3" round cap., m. d.
Shear, rotary, No. 10 Quickwork, 14 ga. 66" throat.
Shear, plate, No. 5 H. & J., 90"x14"-38" throat, m. d.
Slotter, 8" Betts, table 20" dia. b. d.
Slotter, draw stroke, Baker, cap. 24"x38" m. d.
Straightener, No. 1 Kane & Roach, cap. 1" rd. m. d.
Welders, 200 amp. Gen. Elec., -300 amp. Lincoln.
Upsetter, 14" Ajax, all steel, late type.

USED AND REBUILT MACHINERY

FOR SALE BY

Chas. E. Lowe Co.

174 Pearl Street Hartford, Conn.

1" Model G Gridleys, m. d.
 1 1/2" Model G Gridleys, m. d.
 1 3/4" Model G Gridleys, m. d.
 2" Model F Gridleys, m. d.
 Nos. 24, 452 New Britain chucks.
 2 1/2", 4 1/2" Model "A" Cleveland, b. d.
 2 1/2", 4 1/2" Model "A" Cleveland, var. m. d.
 4 1/2" Model J. s. s. Gridley,
 No. 60, No. 6, No. 2 Brown & Sharpe.
 No. 53, No. 55 Acme, m. d.
 40 sets of round collets and pushers for 1 1/2" G Gridley.

Failor-Strafer Machinery Co.

132 Liberty St., - - New York, N. Y.

Drills, 3' and 3 1/2' Cincinnati-Bickford radials,
 Drills, radial 6' Cincinnati-Bickford, s. p. d.
 Drill radial, Amer. 3' sens., tapping attachment.
 Gas furnace, No. 4 American, door opening 8"x14".
 Grinder, No. 14 Pratt & Whitney b. b., vert. surface.
 Grinder, No. 16 Blanchard high power vert. sur., m. d.
 Lathes, 16"x14" and 18"x10" Lodge & Shipley.
 Lathes, LeBlond, 17", 19", 21", heavy duties.
 Lathes, 18"x8" Lodge & Shipley, geared head.
 Lathes, 18"x8" American, modern, 3 step cone, d. b. g.
 Lathe, 30"x8" Cleveland, geared head.
 Lathe, 26"x14" Lodge & Shipley, taper attachment.
 Lathes, 24"x24" and 3"x36" J. & L., bar equipt.
 Miller, No. 1 Cincinnati plain, cone type.
 Pipe machine, 4" Williams, motor drive.
 Planer, 42"x42"x36" Gray, 4 heads, b. d.
 Planer, 48"x48"x16" Gray, 4 heads, b. d.
 Screw mchs. Garvin No. 128, 2 1/2" and 2 pwr. fd., turrets.
 Shears, squaring 12"x16" Ohl.
 Shear, squaring 10"x16" Loy & Nawrath, arr. m. d.
 Turret lathe, No. 4A W. & S., bar and chuck equipt.

Wm. C. Johnson & Sons Machy. Co.

1211 Hadley St., St. Louis, Mo.

Air compressors, 15 in stock.
 Automatic, cone, 1", 1 1/2", 4 spindle, complete.
 Bolt threaders, 1", 1 1/2" & 3" Acme.
 Boring machine, 4 1/2" Bette.
 Boring mills, 6"-8", 14" Niles.
 Brake, Whitney 8", 16 gauge, hand apron.
 Drill, Natco 13 spindle, No. 1 taper.
 Drill, No. 2 Fox, 6 spindles.
 Drill, Moline hole hog, 8 sp., No. 4 Morse taper.
 Drill, radial, 4" Drees and 4" Fosdick; 3 1/2" Mueller.
 Gearhobber, No. 3 Adams.
 Hammers, 300 lb. Beaudry, 75 lb. Bradley, 50 & 100 lb.
 Little Giant.
 Lathe, 14"x8" Hendey belted m. d., taper attach.
 Lathe, 15"x8" Boye & Emmes, q. c.
 Lathe, 21"x16" L. & S. q. c. g.
 Miller, Con. production type, 57"x11" table.
 Miller, No. 14 American.
 Miller, No. 2 Rockford plain.
 Miller, No. 3 Kempamith plain.
 Pipe machines, 2"-4"-6"-8"-12".
 Presses, Nos. 2, 3 & 4 Marshalltown.
 Presses, 3, hydraulic pump & accumulator.
 Press brake, 16' for 16 ga. Ohl.
 Punch, Cleveland E. F. art jaw, 47" thr., with Lysholm
 spacing table, m. d., one-man control.
 Rolls, corrugating, 24" dia., 12' removable dies.
 Roll, plate straightening, H. & J. No. 2, like new.
 Saw, 12"x12" Racine and Nos. 2 & 1 Marvels.
 Shapers 12"-16"-20"-24".
 Shaper, 24" Columbia, motor driven.
 Punches, shears, bulldozers.
 Testing machine, 100,000 lb. Riehle.
 Large stock guaranteed electric motors. Any size.

FOR SALE BY

Wisconsin Gear & Engineering Co., Inc.

602 So. 2nd Street, - Milwaukee, Wis.

Gear generators, Bilgram bevel, 6" & 16"; guaranteed
 to be in A-1 condition with all change gears and
 segments.

Wigglesworth Machinery Co.

199 Bent Street Cambridge, Mass.

Automatics, No. 6-A Potter & Johnson, (2).
 Boring mill, No. 31 Lucas, 96" bed.
 Boring mill, 24" Bullard, side head.
 Boring mill, 36" Bullard, New Era. (2).
 Boring mill, 72" Gisholt, m. d.
 Brake, 12" 4 1/2" Dreis & Krump apron, m. d.
 Drill, 4-spindle Leland-Gifford.
 Grinder, No. 14 Landis, universal.
 Grinder, 14" model B, Pratt & Whitney, m. d.
 Grinder, No. 33 abrasive, m. d.
 Grinder, No. 16 Blanchard, m. d.
 Grinder, No. 2 Brown & Sharpe-Reid.
 Lathe, 16"x12" Walcott, q. c. g.
 Lathe, 18"x12" Rockford, q. c. g.
 Lathe, 20"x8" Lodge & Shipley, grd. hd., late type.
 Lathe, 22"-64"x10" Fay & Scott, gap.
 Miller, No. 2 Brown & Sharpe, (2).
 Miller, No. 2 Cincinnati hi power, s. p. d.
 Miller, No. 3A heavy Brown & Sharpe univ., m. d.
 Planer, 42"x42"x10" Detrick & Harvey (2).
 Press, No. 3 V & O, back geared, m. d.
 Punch No. 20 Pels, armor plate, combination.
 Spline millers, 6" Taylor & Fenn (4) m. d.
 Spline miller, 4" Pratt & Whitney.
 Turret lathe, No. 3 Foster, timken bearing, m. d.
 Turret lathe, No. 4 Brown & Sharpe, wire feed.
 Turret lathe, No. 2A Warner & Swasey (2).
 Turret lathe, 24"x24" J. & L., steel head.
 Turret lathe, 2 spindle, J. & L., steel head.
 Send for Complete List.

Fuchs Machinery & Supply Co.

1102 Farnam St. Omaha, Nebraska

Brake, 12" 1/2" D. K., power leaf, b. d.
 Bulldozer, No. 9 Williams White.
 Compressor, 8x8 Gardner, 140', with motor.
 Compressor, 12x10 Ingersoll Rand ER1 355', motor.
 Drill, No. 2 Colburn manufacturing.
 Drill, 6" Sipp b. b., No. 2 MT.
 Drill, 2 spindle, Henry Wright, 16" overhang.
 Drill, American 3' radial, s. p. d.
 Drill, Canedy Otto, 3 1/2" radial, cone.
 Grinder, No. 17 Besley, disc, belt drive.
 Grinder, 10x30 Landis plain, \$125.
 Grinder, No. 3 Deaterline universal.
 Grinder, LeBlond universal tool.
 Lathe, 14x10 Sidney, q. c. t. a. d. b. g.
 Lathe, 16x8 Lodge Shipley, q. c. d. b. g.
 Lathe, No. 2 Warner Swasey hand turret.
 Lathe, No. 4 Warner Swasey friction head.
 Lathe, 21" Gisholt turret 2 1/2" hole.
 Lathe, Steidle turret, 6" hole.
 Miller, No. 14 Cincinnati plain.
 Miller, No. 14 Brown & Sharpe plain.
 Nibbler, No. 236 Gray W., 36" throat.
 Planer, 36x36x10 N. B. P., b. m. d.
 Press, No. 84 DAG Ferracute, d. a. cam.
 Saw, No. 2, Ryerson friction, 48" blade.
 Shear, No. 2 Ryerson serpentine, m. d.
 Shear, 16" 1/2" No. 9128B Niagara.
 Shaper, 16" G. & E. high duty, s. p. d.
 Shaper, 24" Stockbridge, motor drive.
 Slotter, 16" Putnam, 27" cir. table.
 Welder, 30 K. W. Federal spot.
 Welder, 300 amp. Hobart arc.

USED AND REBUILT MACHINERY

FOR SALE BY

General Blower Company

401 N. Peoria St., - - - Chicago, Ill.

BLOWERS—FANS—EXHAUSTERS.

For Dust Collecting—Ventilating.
Oil and gas burners, cupolas, furnaces, etc.
Roots—Connersville and centrifugal blowers.

What are your blower requirements?

The Elyria Belting & Machinery Co.

Elyria - - - - - Ohio

Brake, 8' x 10-ga. D. & K. power leaf.
Boring mill, 44" Putnam vertical.
Broach, No. 1 LaPointe, single.
Bulldozer, No. 4 Williams & White.
Compressor, Sullivan angle compound, WJ3, 750 cu. ft.
with 150 h. p. motor.
Drill, 30-spindle Fox multiple.
Grinders, No. 3 Wilmarth & Morman surface.
Hammer mill, Jeffrey 24" x 12" Model A.
Lathe, Sebastian geared head, 20" x 10'.
Tool grinder, Bath universal.

FOR SALE BY

Surplus Material & Machinery Co.

8375 Kercheval Ave. Detroit, Michigan

Blowers, 40, 20, & 2 h. p. Spencer Turbo.
Lathe, 36" Gisholt Simplomatic, hardened ways.
Planer, 17' x 18' x 72" Liberty, motor drive.
Press, No. 23-J Bliss overhang, d. c., motor drive.
Press, 45 ton Metalwood, 4 post hydraulic.
Shear, Yoder rotary, 60" throat, like new.

Nelson Machinery Co., Green Bay, Wis.

Bolt cutter, 24" National geared head, motor drive.
Grinder, Cochrane Bly No. 11S Auto. saw, cap. 10" to 32".
Hobber, Barber Colman No. 12.
Lathe, 18" x 18" South Bend, L-2 SBG, reg. equip.
Lathe, 18x8 Schumacher, SBG-LC, cab. legs, reg. equip.
Lathe, 18x8 Reed SBG-LC, reg. equip. and taper att.
Miller, No. 10 Pratt & Whitney.
Pipe threader, No. 6 Bignall & Keeler, dup. improved,
14 to 6".
Press, No. 21 Bliss OBI, 2" stroke.
Shaper, 16" Milwaukee, hol. ram, vee slide.

West Penn Machinery Company

Air compressors, 30 to 2500 cubic feet.
Air compr. portable gas I-R 180 cu. ft.
Blower, No. 4 Roots, capacity 2100 c. f. m.
Bolt cutters, 2" & 3" Acme, b. d.
Bolt threaders, automatic, Landis 1", m. d.
Boring mill, 36" Bullard, side head.
Boring mill, 42" Bullard, 2 heads.
Boring mill, 51" Niles, 2 heads, m. d.
Boring mill, 66" Betts, 2 heads, belt drive.
Bulldozers, Nos. 2, 4, 6, 8, 28, & 30.
Brake, 10'—14 ga., D. & K., hand.
Crusher, jaw, No. 4 Champion, b. d.
Draw bench std. 70,000 lb.—46" draw, m. d.
Drill sharpener, Ing-Rand "Leyner", 14".
Drill, radial 6" Reed-Prentice, single pulley drive.
Drills, 4 multiple Avey, No. 2 m. t., s. p. d.
Drills, upright 10" to 36".
Engine, gas, 20 horse power Bessemer.
Flanger, McCabe, 4" capacity, dies.
Gear cutters, Nos. 5 & 6 B. & S., 60" & 72" m. d.
Gear cutters, 11", 18" & 24" Gleason.
Gear tester, bevel 18" Gleason.
Grinders, centerless Heim, m. d., 220/3/60.
Grinder, drill, No. 31 Oliver, 14", m. d., 220/3/60.
Grinder, knife 16" Bridgeport, m. d.
Grinder, roll, Farrell 28" x 75".
Grinder, surface, No. 1 Diam. 14x24, mag. chuck, m. d.
Grinders, D. E. 3—3 & 5 h. p., 220/3/60.
Grinder, T. & C. No. 1 LeBlond, m. d.
Grinder, disc, No. 8—20" Besly, belt drive.
Groover, No. 275-A Niagara, 6", 16 ga. motor drive.
Hammers, 50 lb., 75 lb., 100 lb., 200 lb. Upright.
Hammer, power, 100 lb. Bradley cushion helve.
Hammers, Nos. 2-B, 3-B, 4-B, 6-B, Nasel.
Hammers, steam, forging & drop.
Keyseater, No. 2 Mitts & Merrill, belt drive.
Lathe, 26" x 12" Putnam, q. c. g., d. b. g.
Lathe, 42" x 16" Schumacher Boye, q. c. g., belt drive.
Lathe, wheel, 78" x 84" Bement, motor drive.
Lathe, spinning 32" belt drive.
Lathe, turret, W & S No. 2A & No. 3A s. p. d.
Lathe, turret, 17x6 LeBlond double back gear 14".
Locomotive, gas, 6 ton Milwaukee, 38".
Miller, plain, No. 3-B B. & S., dividing head, s. p. d.
Miller, plain No. 4 Cincinnati, b. d.
Miller, vertical No. 2 Knight, b. d.
Miller, vertical, No. 5-C Becker, motor drive.

1210 House Building,

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Miller, vertical No. 6 Becker, motor drive.
Mixers, Sprout-Waldron, batch & liquid.
Pipe mch., 2", 4", 6", 8" & 12" Landis-Oster-Williams.
Press, forging, 150 ton United, steam h/d.
Press, wheel 150 ton Caldwell, 42", b. d.
Press, hydraulic 100-ton Southwark.
Presses, OBI, No. 19 Bliss & No. 4 Toledo, 3" str.
Press, No. 55 Toledo, bud 20x19.
Press, double crank No. 3 Bliss, 3" stroke, b. d.
Press, screw, No. 87 Niagara, hand power.
Press, 6 spindle, Waterbury-Farrell.
Press, arch, No. 30 Bliss, roll feed, b. d.
Pumps, centrifugal 6", 4", 1", motor drive.
Punch, comb., No. 12 Hadger, 4" & 14" round.
Punch, E F Cleveland, 36" throat, 14" thru 1".
Punch, multiple, 32 E W & W, 10' 2".
Riveters, air, hammer, spinning.
Rolling mill, cold 9" x 18" motor drive.
Saws, friction, Nos. 2, 3 & 4 Ryerson motor drive.
Saw, cold, 48" Newton motor drive.
Saw, hack, 9x9 Peerless, belt drive.
Shapers, 16", 20", 24" & 36" Gould & Eberhardt.
Shears, alligator, 14", 2", 3", 4" & 6".
Shear, Angle 6x6x1 Long & Allattatter, m. d.
Shear, Niagara 42" x 16 ga., belt drive.
Shear, 5 x 14 ga. Ohl. m. d., 110/220/160.
Shear, 10' 18 ga. Niagara, b. d.
Shear, circle, Niagara, 4" cutters, 16 ga.
Shear, circle No. 3 Bliss, 40" x 20 gauge.
Shear, Guill., No. 5 H. & J., 44" rd., m. d.
Shear, guill., No. 2 H. & J., 24" rd. b. d.
Shear, 10' x 4" Bliss, holddown, b. d.
Shear, plate, 80" x 44" Fels.
Shear, plate, No. 6 H. & J., 64" x 34", m. d.
Shear, plate, Covington 64" x 14", m. d.
Slitter, gang, No. 2 W-F, 18", belt drive.
Slitter, gang, 36" Yoder motor drive.
Slitter, gang, 36" Bradcock, belt drive.
Slotters, 6" & 24" Newton.
Straightener, 12" x 8" Shuster, b. d.
Straightener, AS & TP 12" x 3/16", belt drive.
Straightener, 48" Aetna-Standard, 17 roll 34", m. d.
Thread rollers, W-F No. 20—3".
Tumbling barrel, 34" x 48", belt drive.
Upsetters, 1" to 6".
Welders, spot, 12, 13 & 18 K. V. A.
Welders, arc, 200 & 300 amp. Lincoln.

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quick gear change, 15 h. p., d. c. motor drive.
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automatic indexing turret, for No. 5 Rivett lathe, with
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Good condition. \$90.00; or will exchange for com-
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CHICAGO STEEL APRON BRAKE

8 ft. 3/16" cap. grd. motor drive, with
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150-200 Ton Hydraulic Wheel Press.
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Overhead Traveling Crane, 5 Ton Ca-
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Two Stage 22"x14"x16" M.D.
100 lb. Pressure
1300 cu. ft. Chgo. Pne., OCE.
20"x12"x14", M.D. 125 lb.
Pressure

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8' Hilles-Jones, No. 2 B.D. 5/16"
12' Niles, M.D. Cap. 5/16"
20' Hilles & J., No. 6, M.D. 1"
30' Hil. & J., No. 8 M.D. Cap. 1"
35' Southwark, Arr. M.D. 1"

BORING MILL

12" bar Niles Hor. Cyl. Bor. 15'
Ret. Hou. Arr. M.D. Bore
cyl. 14" min. to 8" max. diam.

BRAKE-LEAF TYPE

12"2" Dreis & Krump, M.D. 1"

BRAKES-PRESS TYPE

8"6" D & K "Chgo." No. 8500,
Arr. M.D. 7/16"
10"4" Nla., Arr. M.D., Cap. 1"
10"6" Bertsch, M.D., Cap. 10Ga.
12"6" Geo. A. Ohl, B.M.D., 1"

BULLDOZERS

No. 7 Ajax, M.D. Face of Cross-
head 12"x76" Stroke 16"
No. 8 Will. & White, M.D. Face
of Crosshead 16"x72" Str. 24"

CRANES-OVERHEAD

ELECTRIC TRAVELING

3 t. Bed. 49'4" 220/3/60 A.C.
5 t. Bed. 35'6" 220/3/60 A.C.
10 t. Case 50' 220/3/60 A.C.
10 t. Nr. 66'9" 440/3/60 A.C.
10 t. Champ. 85'11" Span 440/
3/60 A.C.
15 t. Niles 61' 220/3/60 A.C.
15 t. Nr. 69'6" 220/3/60 A.C.
20 t. Niles 70' Sp. 220 Volt.
D.C. 5 ton Auxiliary
20 t. Bed. 50' Sp. 220/3/60 A.C.
20 t. Morgan 56' Span 230 V.
D.C. 5 ton Auxiliary
20 ton Morgan 62' Span 230 V.
D.C. 10 ton Auxiliary
25 ton Niles 57' Span 230 V.
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25 ton Shaw 59'8" Span 220/3
60 A.C. 3 ton Auxiliary

DRAW BENCH

20,000 lb. Chain, B.D., 40" Draw.

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1" to 7" Ajax, Nat. Acme, St. Fr.

HAMMERS-BOARD DROP-

STEAM DROP-STEAM FORG.

10,000 lb. to 8,000 lb. Chambers,
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Bement-Pond, Morgan

JOGGLING MACHINE

No. 2 Morgan Plate, M.D. Cap.
to joggle 1" Plate 42" f. edge

LEVELLERS-ROLLER

42" Actna 17 Rolls, 2 1/2" Dia.
Capacity No. 16 Gauge
60" Nat. 17 Rolls, 4 1/2" Dia.

MILLING MACHINE-

PLANNER TYPE

48" Newton Horiz. Sp. Planer
Type, Table 42"x12 1/4" Be-
tween Pockets

600 TON BIRDSBORO HORIZ. HYDRAUL. BEND.

& FORMING PRESS
24" Stroke
Face of Ram 24" High, 33"
Wide, 26" Long, Three Main
Cyl. 12" Diam., Equipped
with Full Back Cyl. Two
4-Cyl. Vert. High Pres. Hydr.
Pumps Dir. Driv. by two
40 H.P. A.C. Motors

PLANERS

60"x80"x16" Niles 3-Hd. B.M.D.
72"x60"x31" Pond 2-Head. B.D.
100"x84"x25" P'd 4-Hd., B.M.D.

PLANNER-OPEN SIDE

60"x48"x38" Liberty 3-Hd., M.D.

PRESS-HYDRAULIC WHEEL

200 t. N.-B.-P. Hyd. 48" Bet.
Parallel Bars, B.M.D.

PRESSES-STR. SIDE-S. A.

No. 31 Bliss Double Crank, 2"
Stroke 36" Between Uprights
No. 7 Bliss Double Crank, 5"
Stroke, 45" Between Uprights
No. 96F Toledo Double Crank,
12" Str. 124" Bet. Uprights
No. 2719 Hamilton 8" Stroke,
27" Between Uprights

PRESSES-TOGGLE DRAW.

No. 498B Bliss, Bed Area 44"x
60", Str. of Blankholder, 10"
Str. of Plung. 15"
No. 1018 Bliss, Bed Area 60"x
72", Str. Blankholder 12",
Stroke of Plunger 24"

NO. 2 HILLES & JONES

PLATE STRAIGHT. ROLL

Six 10" Diameter Rolls

Capacity 1 1/2" Plate

Motor Driven, Including

A.C. Motor

PUMP-HYDRAULIC

5"x12" Worthington Horizontal
Duplex, Cap. 200 GPM, 1500
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COMBINATION

No. EF Cleve. Mtr. Dr. 48" Thr.
Cap. Punch 14" thru 1 1/2" Fur-
nished with or without 13
shoim Adj. Spac. Tables,
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M. D. 60" Thr.; Cap. Punch
2" thru 1 1/2". Furnished with
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10 1/2"x12" UE&F Sgl. St. 2 H
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22"x28" Univ. 3 High Mill
complete install. incl. moto
19" Morgan 8 Stand Contin
Sheet Bar and Skelp Mill with
3 Stands of Vertical Rolls
24" UE&F Co. Bar Mill

SHEAR-ANGLE

8"x8"x1" Kling Double Angl
Shear M.D. Mounted on Turn
table

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No. 3 Hilles & J. Guill Type
Arr. M.D. Cap. Shear 3" Rd
2 1/2" Sq., 10"x11" Flats, 6"
6"x12" Angles
No. 10 Buf. Armor Plate, B. e
M. Dr. Cap. to Shear, 3 1/2"
Rds., 3 1/2" Sq., 8"x14" Flats
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Mackintosh Hemphill Bloom
Shear, M. D. Cap. 10"x18" H.P.
UE&F Hydraulic Shear, for ho-
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96" Covington, M.D. Max
Cap. 1" Pils. 30" Thr.
Cam Operated Spring Type
Hold Down

SHEARS-GATE

12' Beatty Meke. & Mfg. Co.
M.D. Cap. 1" 27" Thr. Hdw
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7' Stoll, Motor Driven, Cap. 1 1/2"
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15" - 18" Dill Vertical Slotted
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Table with Horizontal and
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Cleveland	Mod.	Ser. No.	Driv.
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—1¼"	A	27000	Plain
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—¾"	A	26000	Plain
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—6.00 Full Auto.		5988	Plain
—1 Full Auto.		4200	Plain
—1 Full Auto.		?	Plain
evenport			
—		312	A.D.
idley			
—1¾" 4 spdl.	F	6624	10 H.P.
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 sp. Leland-Gifford sens. h.s., b.b. cap. ¾"
 sp. Avey No. 2 h.s., b.b., cap. ¾"
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Rivett ¾" cap. with sc. mach. tur. & cut off
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 Hand Millers, Kent-Owens, Chicago, Whitney.
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25 ton Henry-Wright, dieing, with feeds, b.d.
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 No. 3 R & K, O.B.I., 2½ str.

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20" Amer., back grd., crank, vise, c/s.
 Hammers, High Speed, 5A & 3A
 Threading machine, 2" Landis belt drive.
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 Squaring Shears, Power, Nia., 36" & 42"
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BRAKES—D. & K., 5' Box & Pan, 14 ga. D. & K. 10" 10 ga. Leaf type Power & Keene 10" 16 ga. Toggle Press.

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DRILLS (RADIAL)—Mueller 2½", Fosdick 2½", Prent. 3"; Carlton 4" all gear box dr.; Hammond 4" sensitive; Amer. 2½" M.D. gear box. Mueller 4½" g.box.

DRILLS (H. S. B. B.)—H & W 2, 4, 5sp.; Allen 2 & 6-sp.; Avey, Demco, Lel-Giff. 1-sp.; Avey 2-sp.; Aveymatic 2-sp., m.d.

DRILLS (MISC.)—Baker No. 217 (2) & No. 314 Hvy. Duty; Hamilton 42" S.H.; Barnes 20" & 24" 1-sp. & 20" 4-sp. & 24" 3-sp. all grd. camel back; P & W No. 12 Multi-Sp.; Natco 20-sp. Rect. head.

GEAR CUTTERS—G & E 60" & B & S 26" s. p. d. automatic spur; Fellows 24" gear shaper. Cincinnati 36" gear cutter.

GRINDERS—P & W 12" vert. surf.; Cin. No. 1½ & B & S No. 12 univ. tool, B & S Nos. 11616 pl. Heald Nos. 60665 Int.; Landis 10x30" Plain; B & S 10x48"; 3—Norton 6x32" plain, Heald No. 20 Rotary Surface (3). B & S No. 2 Univ.; Badger No. 220, auto. d. e., opposed disc (4); Modern No. 6 Int.; Brown & Sharpe No. 2 surf.; B. & S. No. 10 pl. self-cont.; Norton 10"x36".

KEYSEATERS—Mitts & Merrill No. 5 vert. Davis No. 1; M.&M. No. 0; Catlin No. 2.

LATHES—Monarch 16"x10" M.D.; LeBlond 18x8"; Lehmann 18"x9"; Amer. 22x8"; Davis 22"x10"; L & S 20"x10"; S-B & E 20"x10" q. c. q.; Flather 22"x10"; Bradford 21"x10"; LeBlond 16"x8"; P & W 17"x10"; Gleason 45"x12"; Johnson 36"x24"; Monarch 16"x8" (2). Hendey 14"x6" & 16"x8"; Whitcomb-Blaisdell 24"x12", m.d., q.c.g., geared head.

MILLING MACHINES—Ohio No. 29 Univ.; Kemp. No. 3; Brown & Sharpe No. 3; Cleveland No. 1 single pulley dr., univ.; Amer. No. 1½; Cin. No. 3; B & S No. 3; Hendey No. 3; LeBlond No. 3; Mil. No. 3-B & Cinc. No. 3 s. p. d. pl.; Becker Model "B" & No. 6 vert.; Kemp. No. 33 spd. Prod.; Ingersoll slab, M.D. 33", table 30½"x16"; LeBlond No. 4 m. d. pl. Cin., No. 1½ Univ. M.D.; Cin. No. 4 pl. Cleveland No. 2 S.P.D., Pl. B.&S. No. 0 Pl.

PLANERS—Gray 30"x30"x10" 2 heads; Gray 48"x48"x10"; Gray 28"x28"x6" 1-hd.; Pond 32"x34"x10"; Hamilton 60"x36"x10", 2 heads.

PUNCH PRESSES—Federal Nos. 1, 2, 3 o.b.i.; Bliss No. 62 geared; Bliss No. 18 & 19; Ferracute No. P-4; Toledo No. 52 arch; Fer. No. EGF 52 Coining; Willard No. 4A o.b.i.; Swaine No. 38 arch, high power; Cincinnati 24" automatic; Swaine No. 37 o.b.i.; Bliss No. 83 Reducing; Rockford Nos. 2 & 3; and Verson No. 4 o.b.i.; Bliss No. 19-C; Mich. No. 4, o.b.i.

SAWS (HACK)—Rac. 6x6" h.s.; Rac. 8x8; Peerless 6x6" H.S. (4); Peerless 6x6" M.D. Univ. Shaping (2); Peerless 13x16".

SHAPERS—S & M, G & E, Ohio, Ml., Q. City, Davis, Cin. 16"; Ohio & G & E 20"; S & M, Q. City, Rock. 24"; Ohio 26"; Cin. 24" s. p. gr. box; Rhodes 3½" Vertical; American 24" heavy, b.g. Amer. 15"; Springf. 15"; S.&M. 26", b.g. G. & E. 24", s.p., gearbox.

SCREW MACHINES—W.&S. Nos. 4, 6, & 8 Hand; Nat. Acme. Nos. 515, 52, 55, 4-sp.; Gridley 4-sp. ¾"; Automatic, B. & S. No. 00 Auto.; B.&S. No. 009; Gridley 4 spindle, 2¼".

SLOTTER—Bement-Miles 10" vert.; Barr 12".

SQUARE SHEARS—Tol. 72", 14 ga.; Stoll 42", 14 ga.; Niagara and Pexto 6', 10 ga. Pwr.

Niagara and Pexto 6', 10 ga. Power.

TAPPING MACHINES—(2) Garvin No. 2 & 2X Vertical Automatic & Garvin No. 1.

TURRET LATHES—Bullard 36" vertical, rapid production. Bausch 30" M.D.; Bullard 24" vert., rap. production.

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NORTON 3"x18" Cylindrical Grinder, 10"x50" countershaft.
 ABRASIVE No. 3 Surface Grinder, Motor Drive.
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 LODGE & SHIPLEY 24"x16' Screw Cutting Lathe, 12 speed geared Head, Single Pulley or motor drive. Serial 26,000.
 PRATT & WHITNEY No. 13 Multiple Spindle Drill Press, rectangular head.
 ALLEN High Speed Sensitive Drills 2, 3, and 4 Spindle.
 CINCINNATI-BICKFORD Radial Drills, 3½'.
 NATCO No. 14 Multiple Spindle Drill, 22 spindles, R. A. Head, 18"x26" Table 22"x30", S. P. Drive. Serial 11,200.
 BROWN & SHARPE Hand Screw Machines, No. 2 c./s. drive, Nos. 0 & 1 Motor Drive.
 BETTS 18" Crank Slotter, countershaft drive. Will slot center of 85" diameter.
 GOULD & EBERHARDT Crank Shapers, Cone Drive 24"—16"—14".
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 GRIDLEY 1¼" 4 Spindle Automatic Model F, countershaft drive.
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24⁸ Gisholt; 6 1/2" spindle; B. D.
3"x36" Jones & L.; S. P. D.

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36"x36"x20" Chandler; 4 heads; M. D.
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1 1/4" Cone 4-Spindle; Motor Dr.
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Binsco, 3 1/4" bar.

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1-3 Spindle 1/2 inch.
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Merrill 6", Quick. open die hd.

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Rogaco Portable 2" (2).

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No.	Dia. Small End	Dia. Large End	Shank Size Taper	Overall Length	Price Net
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1	¾"	1½"	3	16½"	12.50
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 36" Bullard "New Era" (2).
 42" Bullard "New Era".
 42" Gisholt, motor drive.
 42" King, motor drive.
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 60" Gisholt, motor drive.
 72" King, motor drive.
 72" Niles, Bement, Pond.
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 No. D-4 Colburn Heavy Duty.
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 No. 1, No. 3, No. 4 Baush Multiple.
 3" Cinn.-Bickford, motor-on-arm.
 3" Western Plain Radial.
 4" Western, motor on column.
 4" Carlton plain.
 5" American triple purpose.
 6" American plain.
 6" Western Plain Radial.
 7", 8" Western heavy Radial.

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 No. 3-26" Brown & Sharpe.
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 No. 2-60" Goss Hobber.
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 No. 70 Heald Internal.
 No. 16-26" Blanchard vert. surface.
 No. 16-A Blanchard Auto. Vert. Surface.
 No. 22-12" Heald Rotary Surface.

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- 14"x6" L.&S. grd. hd., motor in leg.
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 18"x8" L.&S. Grd. Hd., taper att.
 18" x 12" American, geared head.
 20"x10" Lodge & Shipley Grd. Hd.
 20"-40"x10" Rahn-Larmon, geared head, sliding bed gap.

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GRINDERS

6"x32"	10"-15" gapx72"	16"x50"
10"x18"	10"x96"	18"x72"
10"x24"	10"x120"	18"x96"
10"-15" gapx24"	14"x36"	18"-24" gapx96"
10"x36"	14"x50"	21"x96"
10"x50"	14"x72"	21"x144"
10"x72"	14"x96"	23"x120"

LATHES—Continued

- 22"x12" L.&S. Grd. Hd. taper att.
 24"x10", 12", 14", 16" L. & S., grd. hd.
 24"x14", 16" American, Geared Head.
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 27"x12" American Geared Head.
 30"x11", 15" American, Geared Head.
 30"x12" Lodge & Shipley, taper att.
 36" x 21" American geared head.
 36" x 22" Lodge & Shipley, grd. hd.
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 46"x30" Houston, Stanwood & Gamble, m.d

MILLERS

- No. 2-A Milwaukee plain.
 No. 2 Cincinnati plain.
 No. 3-B Milwaukee plain.
 No. 3, No. 4 Cincinnati, h.p., plain.
 No. 4-B Brown & Sharpe, plain.
 No. 2½ Rockford Universal.
 No. 3-B Milwaukee Vertical.
 No. 5-B, No. 6, No. C-2 Becker Vertical.
 6"x14", 6"x48" Pratt & Whitney Thread.
 No. 4, No. 12 Lees-Bradner Thread.
 No. 5-48" Cincinnati Hydromatic.
 18" & 24" Cincinnati Auto. Duplex.

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 No. 1½ V&O., O.B.I., M.D.
 No. 20 Bliss, O.B.I., M.D.
 No. CG-24 Ferracule O.B.I., Geared, M.D.
 No. 3; No. 5 V&O., O.B.I., grd., M.D.

TURRET LATHES

- No. 5 Foster Univ., Timken Bearing.
 No. 1-B Foster Universal.
 No. 1-A Warner & Swasey, Motor Drive.
 No. 2-A W. & S., A. C. & R. F.
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24" Bullard, New Era Side Hd.
42" Bullard, 2 Heads, Geared.
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No. 12 Barber-C., R. T. (4).

GRINDERS

No. 24 Gardner, 53" Horiz.
Disc, Motor in Base.

No. 33 Abras., 5" whl., M. D.

LATHES

14x6 Flatner, Q. C. G., T. A.
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16x8 Monarch, Q. C. G., T. A.
20x8 LeBlond, Q. C. G., T. A.
24x12 Advance, Q. C. G.

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No. 2 Kemp., Univ., Ful. Eqd.
No. 3 Brown & Sharpe, Plain.

SCREW MACHINES

No. 2 Brown & Sharpe.

No. 6 W. & S. Pl. & Univ.
No. 2A W. & S. Univ., (2).

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16" Queen City, back geared.
28" Amer. B. G., Hvy. Duty.
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Square SHEARS and BRAKES

4" Streine, 10 Ga. Capacity.
8" Pexto, 16 ga. Cap., M. D.
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BLISS AUTOMATIC GANG PRESS: No. 103S;
makes 8 operations simultaneously; 180
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MOTORS—All Sizes; large stock.

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28"x10" Hamilton Lathe, Q. C. G. Cone.
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New No. 5½" SA Standard Swaging Machine, Cap.
2¼" Dia. Tubes.

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- 20" Baker No. 216 heavy duty.
- 20" Baker, No. 217 heavy duty.
- 20" Colburn No. 2 Mfg. heavy duty, single spindle.
- 20" Colburn No. 2 Mfg. heavy duty, two spindle.
- 20" Minster No. 0 Hi-Duty.
- 21" Superior, back geared, power feed.
- 21" Cincinnati Bickford slid. hd., back gears, p. f.
- 21" Cinc. "Dir. Dr." Mfg., Horiz. mtr.-on-top.
- 21" Weigel, sliding head, back gears, pwr. feed.
- 21" Hoefler, plain hand feed.
- 21" Baker No. 121 heavy duty.
- 21" W. F. & J. Barnes, slid. hd., back gears, p. f.
- 21" W. F. & J. Barnes, stat. hd., b. grs., p. f.
- 21" Mechanics, plain hand feed.
- 21" Bickford, slid. hd., back gears, power feed.
- 21" Cinc. B. slid. hd., back geared p. f. Thirty-nine in stock. Belt or m.d., with or without tapping attachment.
- 24" Cinc. B. box column Mfg. type, Hor. mtr. on t.
- 24" Aurora, slid. hd., back grl., p. f., with or without tapping attachment.
- 24" Barnes Drill Co., all geared, self oiling.
- 24" Bakers, No. 217, 314, 315, 321, heavy duty.
- 24" Colburn No. 4 heavy duty.
- 24" Foote Burt No. 25, heavy duty.
- 24" Kokomo Hi-Speed, slid. hd., b. grs., p. f. at.
- 24" W. F. & J. Barnes stat. hd., back gears, p. f.
- 24" Superior, sliding head, back geared, p. feed.
- 24" W. F. & J. Barnes, slid. hd., b. grl., p. f.
- 24" Hoefler, slid. hd., b. grs., p. f. tapp. att.
- 24" Superior, slid. hd., b. grs., p. f. tapp. att.
- 24" Cincinnati, slid. hd., back gears, power feed.
- 30" Snyder, slid. hd., b. grd., power feed, tap. at.

DRILLS, MULTIPLE, RAIL AND MISCELLANEOUS

- 4 spindle No. 17 Foote Burt rail.
- 8 spindle No. 6D Moline Holehog.
- 8 spindle Moline No. 16D Holehog.
- 8 spindle No. 10D Moline cylinder borer.
- No. 11D Moline Holehog, 4 to 8 spdl., p. r. trav.
- 8 spindle No. 12 Natco, 10"x10" or 12" rd. hd.
- 8 spindle No. B12 Natco, 12" round head.
- 12 spindle No. 11 Natco, 11" round head.
- 12 spindle No. 12 Natco, 12" round head.
- 12 spindle No. 12 Natco, 10" x 16" head.
- 12 spindle No. C12 Natco, 12" round head.
- 12 spindle No. C12 Natco, 10" x 16" head.
- 12 spindle No. 30 Natco, 16" x 24" head.
- 16 spindle No. 11 Natco, rail type.
- 16 spindle No. 13 Natco, 12" x 18" head.
- 16 spindle No. C13 Natco, 12" x 18" head.
- 16 spindle No. 22 Natco, 12" x 18" head.
- 16 spindle No. 1 Baush, 16" x 20" head.
- 16 spindle No. 13 Pratt & Whitney, 9"x21"hd.
- 18 spindle No. 13 Natco, 14" round head.
- 22 spindle No. 14 Natco, 16" x 24" head.
- 24 spindle No. 13 Pratt & Whitney, 20"x40"hd.
- 34 spindle No. B14 Natco, 22"x38" head.
- 34 spindle No. 30 Natco, 16"x32" head.
- 34 spindle No. 30 Natco, 22" x 38" head.
- 48 spindle No. 30 Natco, 22"x38" head.

Garvin duplex hor., Nos. 0, 008 and 18.
 Barnes double end, 40" swing, 40" bet. spindles.
 Natco 1 & 2-way drillers & tappers, Hyd. feed.
 5 spindle Detroit auto. with fixtures.
 2 spindle Hoefler No. 2 type BA1 adj. drill head.
 4 spindle Kingsbury, No. 8 unit heads.
 3 way Foote Burt for multiple heads.
 Nos. 15j and 15jF Foote B. for mul. heads.
 Avey motor driven unit head, No. 2, 8" capacity.
 24" Avey No. 2 drill head.
 Kingsbury two way with No. 18 unit heads, M.D.

DRILLS, RADIAL

All have single pulley or motor drive and tapping attachment unless otherwise noted.

- 3' Cincinnati Bickford.
- 3' Dreeses.
- 3 1/2', 4', 5', 6' Western.
- 3 1/2' Morris.
- 4' Hammond elbow arm sensitive, tap. attachment.
- 4' Almond elbow arm sensitive, with and without tapping attachment.
- 5' Bickford No. 1.
- 5' American trip purpose, enclosed head, M.D.
- 6' Niles Bement Pond, full universal.
- No. 3 Barnes horiz. Cone or SPD, no tapping.

PRESSES

- 750 ton Southwark triple ac. hy. tog. draw.
- 142 1/2" bet. uprights, 84" shut ht., 550,000 lbs.
- 600 ton, 664 Tol. coin., 40" bet. uprights.
- 108" No. 7964D Tol. Dble. Crk. Tog. Drawing.
- No. 14B Bliss toggle draw.
- No. 164 (173) Toledo toggle draw.
- No. DDG54 Ferracute, cam draw.
- 60" No. 205E Tol. gap frame double crank.
- 48" No. 6A Bliss double crank, Tie rod, fr. roll fd.
- 45" No. 151 Ferracute Dbl. Cr.
- No. 173B Tol. dbl. cr. overhanging.
- 28" No. 71 Swaine double crank.
- No. 5-1 Cleveland O.B.I.
- No. 5-1 Consolidated OBI.
- No. 6 Bliss Consolidated O.B.I. shaft.
- No. 6 Bliss Consolidated O.B.I.
- No. 6 Toledo OBI.
- No. 10-1 Cleveland, O.B.I., 14,000 lbs.
- No. 75 grl. Toledo, OB, non-incl.
- No. 76 Toledo open back geared.
- Waterbury Farrell openback, 3 1/2" cr.
- Fremont openback, 4 13/16" crank.
- Nos. P2, P3, Ferracute.
- No. EG35 Erie punching.
- No. 94 Consolidated Punching.
- Nos. 4A, 5A, and 568S, Toledo, Straight Side.
- Nos. 65 & 66 Consolidated.
- No. 7 Rockford, S.S.
- No. 8-7 Zeh & Hahnemann, S.S.
- No. 74 Bliss, S.S.
- No. 304 Bliss, arch frame.
- No. CA 14 Ferracute horning.
- Nos. 41 & 41A Toledo, horning.
- No. 24A Bliss horning.
- No. 254 Consolidated horning.
- Nos. 4A, 5A & 16 Bliss, horning.
- No. 2 Standard screw.
- Small Emco bench type.
- No. 4N V. & O. armature notch.

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MILES MACHINERY CO.

SAGINAW, MICHIGAN

HIGH GRADE MACHINE TOOLS

No. 4S CINCINNATI PLAIN MILL—S.P.D.
 No. 3 CINCINNATI UNIVERSAL MILL—S.P.D.
 No. 2 BROWN & SHARPE VERTICAL MILL—S.P.D.
 No. 10 BLANCHARD MOTOR DRIVEN ROTARY SURFACE GRINDER—16" chuck
 No. 1A WARNER & SWASEY TURRET LATHE—Serial 240,000
 No. 2A WARNER & SWASEY TURRET LATHE
 No. 4 WARNER & SWASEY CONE DRIVEN TURRET LATHES—Plain and Universal
 CINCINNATI DUPLEX MILL—18"
 SUNDSTRAND RIGID MILL—No. 3
 LEES & BRADNER GEAR HOBBER—No. 5A
 FELLOWS GEAR SHAPERS—No. 7A
 9/16" and 3/4" GRIDLEY AUTOMATICS—Model G 4 spindle
 No. 11 BROWN & SHARPE GRINDER—S.P.D.
 No. 6A POTTER & JOHNSON TURRET LATHE—M.D.
 24" GOULD & EBERHARDT SHAPER—M.D.
 20", 24", 28" GOULD & EBERHARDT SHAPERS—cone driven
 3 x 36" JONES & LAMSON TURRET LATHES—motor driven
 SPRAGUE DYNAMOMETER—75—150 HP

HUNDREDS OF OTHER MACHINE TOOLS IN STOCK

Indianapolis Machinery & Supply Co., Inc.
 1959-69 SOUTH MERIDIAN STREET, INDIANAPOLIS, INDIANA

DEPENDABLE MOREY VALUES

BORING MILLS

Cleveland 2 1/2" bar, horizontal.
 Landis No. 35—3 1/2" bar, horiz.
 Beaman & Smith 4" bar, horiz.
 Bullard 36" N. E. vertical.
 N. B. P. 38—44" vertical.
 N. B. P. 54" vert. 2 swivel heads.
 Gisholt 42" vertical, p. r. t.
 Colburn 72" vert., 2 swivel hds.
 Niles 90" vertical.

LATHES

American 24"x12" geared head.
 Putnam 36"x28" g. h., nearly new
 Lodge & Shipley 24"x12" cone.
 Le Blond 25"x16" cone.
 Hendey 14" to 24"x6" to 12".
 Lo Swing 8x60", latest type.
 200 other lathes—all sizes.

PLANERS

Liberty 44x42x18", 4 heads.
 Cleve. 48"x48"x16", 4 hds. o. s.
 American 36"x36"x20", 3 heads.
 W. & P. 60"x42"x19"—4 heads.
 Niles 60"x60"x12", 2 heads.
 Niles 72"x72"x16", 2 heads.

DRILL PRESSES

Natco Nos. 12, 13 & 22 mult. sp.

Natco C11 drill, mechanical fda.
 Natco C13H drill, hyd. feeds.
 Pratt & W. No. 12 rect. head.

DRILL PRESSES—RADIAL

Cinc. Bick. 3 1/2", 4", 5", 6" plain.
 Baush 6" plain.
 Western 6" plain.
 American 6" univ.

GRINDERS

Abrasive No. 5 surface.
 Blanchard No. 16A, dial feed.
 Blanchard No. 16, m. d.
 Heald No. 20, No. 22.
 Heald Nos. 55, 60, 65, 70 inter.
 Heald No. 25 rotary surface.
 Landis 6x18, 10x24, 12x36 pl.
 Norton 10x36, 14x72 plain.
 Norton type B-81, 14x30—36".
 B. & S. No. 1, No. 3 univ.

MILLING MACHINES

B. & S. No. 3A, univ. motor-in-
 base.
 Kempnith No. 3 univ. cone dr.
 B. & S. Nos. 2B, 3B, plain.
 Hanson & Whitney Thread.

Lees-Bradner No. 8 Thread.
 Cincinnati 18", 24", 48" auto.
 Ingersoll 24x24x12", 36x36x12",
 3 hd. adj. rail.

TURRET LATHES

Gisholt 24", 64" hole.
 W. & S. Nos. 2, 4, 6.
 Foster Nos. 2, 4.
 Potter & Johnston No. 6B auto.

GEAR CUTTING EQUIP.

Barber C. Nos. 3, 12 g. hobbers.
 Gould & Eberhardt No. 18-H
 Cleveland 8 spindle spline hob.
 Gleason 10", 15" spiral bevel.
 Gleason 24", bevel gear.
 Fellows No. 6B burnisher.
 Fellows Nos. 6, 61, 515, 7, 71, 7A.
 Lees Bradnerlapper, cap. 1 1/2"x8"

MISCELLANEOUS

Nazel No. 8 Hammer.
 Sellers 42" wheel lathe.
 Ohio 36" Super-Dreadnaught
 Shaper.
 Columbia 24" Shaper.
 G. & E. 32" Invincible Shaper.

MOREY MACHINERY COMPANY

410 BROOME STREET,

NEW YORK, NEW YORK

UNUSUAL TOOLS

SOLD WITH AN ABSOLUTE GUARANTEE OF SATISFACTION

Automatics

- 7 $\frac{1}{2}$ " & 13 $\frac{1}{4}$ " Cone, 4 spdl., m.d. (5).
- 7 $\frac{1}{2}$ " & 11 $\frac{1}{2}$ " Cleveland, Model M, 4 spdl., m.d.
- 13 $\frac{1}{4}$ " Gridley Model F., m.d. (2).
- 2" Cleveland Model A., s.s. (3).
- 2" Cleveland Model B, s.s. m.d. (3).
- No. 3 New Britain 6 spdl. arranged for both chucking and bar work. (3).
- 6"x6 $\frac{3}{4}$ " Goss & Del. Chuck., m.d.&m., chks(2)
- Brown & Sharpe, O, OO, OG, OOG, No. 2 (30).

Drills

- 2 spdl. Henry & Wright, No. 3 M.T., P.F.
- 2, 3, 4 spdl. H & W., Allen, Lel. G., Avey (33)
- 3, 4 & 6 spdl. All. Hi-Sp., P.F., Tapp. At., I.T.
- 4 spdl. Fosdick, No. 3 M.T., P.F.
- 6 spdl. Cincin. Bick., dir., motor dr.
- 6 spdl. Allen, power feed to spdl.
- 3' Amer. Hi. Sp. Rad., motor on arm.
- 31 $\frac{1}{2}$ " Morris Radial, Single Pulley Drive.
- Moline Hole Hog, various sizes (5).
- Leland Gifford, 2, 3, 4 spdl. P.F.
- Fox Mult. spdl. with Tapp. att. (4).

Gear Equipment

- No. 16 High sp. G.&E. Hob., s.p.d.
- No. 18H Gould & Eberhardt Hobb.
- No. 36 S.T. G. & E., Auto., 4 s. Gr. R., m.d.

Grinders

- No. 22 Heald Rotary Surf., m.d.&m., 12" chk.
- No. 78 Wilmarth & Morman Surf., m.d.&m.
- No. 3 Abrasive Surf., m.d. & m. (2).
- No. 103 Rivett Internal
- Arter No. 132 Drum Type, m.d. (2).
- Norton Model B Tur. type, m.d. (2).
- No. 126 Gardner db. spdl. op. m.d., hyd.f.d.
- 53" Besley Vert. Disc, m.d. & m.
- Nos. 6, 12A & 20 Bryant (12).
- Nos. 10, 12 & 14 B & S Cyl. (8).
- 12" and 16" x 36" Cinc. Pl. Cyl. (2).
- Oakley Tool & Cutter (2).
- Landis 10"x24" s.p.d.

Lathes

- 18"x8" Hendey Engine, taper att.
- 16"x6" Hendey Geared Head, t.a.
- 24"x12" American Geared Head.
- Fay Automatics, 14" standard (7).
- Gisholt Simplomatics, m.d. (2).
- 28"x8 $\frac{1}{2}$ " 31"x10" W. C/s ec. hds., m.d.&m.
- 24"x10" L. & S. Crank, m.d. & m.
- 34"x11" Wickes Crank, m.d. & m. (2).
- No. 5A, 6A P & J Auto., m.d. (12).
- P & J Auto. Unimatic, m.d. & m. (2).
- No. 9 LeBlond Multi Cut.
- No. 2, 4, 6 Warner & Swasey Turret (8).
- 12"x6" Hendey Cone.

Mills

- No 3 Kent Owens, Power feed, m.d.&m.
- No. 2 Van Norman, b.m.d.
- Pratt & Whitney Thread, 9" x 18".
- Nos. 1, 2 & 3 Craftsman Rot. Prod.
- 18" Cincinnati Semi Auto., sgl. & dup. hds.

- No. 12 P & H Boring, floor type, 7" dia. quill, m.d. 5 $\frac{1}{4}$ " dia. spindle nose.

Planers

- 24"x24"x6" Gray Dble. Hag., b.m.d.
- 36"x60"x14" American, widened to 60".
- 60"x60"x12" Niles-Bement-P., box table.

Presses

- 2-ton Flexible, m.d.
- No. 5A Toledo, O.B.I., flywheel type.
- No. 61 $\frac{1}{2}$ Toledo, O.B.I., G.M.D., B.G.
- No. 61 Cleve. O.B.I., G.M.D., (4); No. HG HG Cleve., (3), Equiv. No. 6—O.B.I.
- No. 5 Canco, 8" str., S.S., bk. grd.m.d.&m.
- No. 62 Toledo, S.S., Bk., Grd., m.d.
- No. 771 $\frac{1}{2}$ Bliss S.S., S.C., Tie rod.
- No. 781 $\frac{1}{2}$ Bliss S.S., S.C., tie rod (3).
- No. 24 Toledo, cam. draw., m.d. & m.
- No. 4A Bliss swinging adj. table, m.d. & m.
- 150 ton Ferracute knuckle joint.
- 10 & 25 ton H. & W., dbl. rl. fds., b.d.&m.d.
- No. 14 Toledo Horning, grd. mtr. dr.
- No. 204A Bliss Adj. bed Horn., bk. grd., m.d.
- P-2, P-3, P-4 Ferra., solid back, q.m.d. (12)
- DG-53 Fer. S.S., S.C., B.G., G.M.D.
- Bliss Consolidated No. 3, 4, 5, m.d.
- 100 Ton Oilgear Hydraulic, m.d.

Shears

- 52", 14 ga. Niagara, b.d.
- 6', 16 ga. Bertsch, b.d.
- 6', 16 ga. Pexto, m.d. & m.
- 8', 1 $\frac{1}{4}$ " Toledo, b.d.
- 10', 14 ga. Bertsch, m.d. & m.
- 10' $\frac{3}{4}$ " cap. Nia. Gap Fr., late type, m.d.&m.

Upsetters

- 1 $\frac{1}{2}$ " National, Steel Bed.
- 1 $\frac{1}{2}$ " Acme, steel bed, m.d.
- 3" Acme Steel Bed, m.d.

Welders

- 100 KW Thompson Projection Spot.
- 200 KW Federal Projection Spot.
- Taylor Winfield, National, Federal m.d. Butt (12)
- Taylor Winfield 4 way Flash Welder m.d.
- Taylor Winfield, Federal Thomson Spot (34).

Miscellaneous

- Balancer, 18" Gisholt Static, Vert.
- Bender, No. 3U Pedrick m.d. & m.
- Boltcut., 2 sp., 3 $\frac{1}{4}$ " cap., Landis, ld. scr. att.
- Boltcut., 2 sp., 2" cap., Landis, ld. scr. att.
- Borer, 2 sp. Coulter Diamond, motor in base.
- Oil Groover, Wicaco, Vertical type.
- Pipe Threader, No. 3 Wil., m.d.&m., 5" cap.
- Pipe Threader, No. 316A Oster, 6" cap.
- Polishers, U.S. Electrical Tool, m.d. in base, 4-brg., h.d. type (16).
- Profilers, Nos. 2, 3, P & W., m.d. (3).
- Punch, Mod. ID C, Sgl. End, m.d., cap. 2 holes, 1 thr. 1 $\frac{1}{4}$ ", 36" thr. flang. ram, l.t.
- Rivet Hesters, Berwick (4).
- Slotter, 20" Sellers, b.m.d.
- Tapper, No. 3 Holmes Tilt., 4 spdl., late type

AND A COMPLETE STOCK OF FINE UP-TO-DATE EQUIPMENT

HARVEY GOLDMAN AND CO.

10571 GRATIOT AVE. DETROIT, MICH.

3000 MACHINES IN OUR WAREHOUSES

BORING MILLS

Bullard 12" - 6 Sp. Multiautomatic
Niles 42" 2nd Head.
B. 36", 42", 2 hds. on rail.
Bullard 76" vertical.
Barrett No. 2 cyl., 5" bar.

DRILLS

P. & W. Nos. 11, 12, 13 Mult.
Cine-Bick 3" and 4" Radials.
Fosdick 4" Radial, M.D.
N-B-P 6" Radial, Univ.; Reed-
Prentice 6" Radial.
Upright Drills—All mak. & siz.
Allen 3, 4, & 6 sp. B.B.

GRINDERS

Cincinnati No. 2 Centerless
Blanchard No. 16.
P. & W. 14" & 22" B.B. Surf.
R. & S. Nos. 1, 2, 3, Univ.
Bryant Nos. 6, 10A, 18A, 8-A.
2 Sp. Hole, No. 40 Chuck.
Disc Grind.—All makes & siz.
Norton 10"x18" M.D. Plunge
Cut.

Nort. 6x32", 10x36", 10x50",
14"x72" Pl. Cylindrical.
Heald No. 72A3 Gagematic, M.D.
Heald No. 70 Internal.
Heald No. 72 Hyd. Internal.
Heald Nos. 22, 25 Rot. Surface.

LATHES

Hendey Lathes—most sizes.

Lodge & Shipley 18"x6", S.G.H.
American 20"x8", g.h.
New Haven 24"x12"; 24"x20",
Pittsburgh 32"x24", q.c.g.
American 36"x17", 6 H.
W.&S. Nos. 1A, 2A, 3A Tur.

MILLERS

Brown & Sharpe No. 2A Universal
Kemp Smith No. 3 Universal.
Hendey Nos. 2G, 3G Univ.
Cincinnati No. 1M Univ. SPD.
Brown & Sharpe No. 3 Universal
Van Norman Nos. 2, 20 Univ.
Lincoln Millers of all kinds.
P.&W. 6"x14", 6"x48" Thread
Millers.

Milw. & Garvin Cam Millers.
Milw. No. 2B Doub. Over, Plain.

PRESSES

Bliss No. 18, 19 & 20 O.B.I.
V. & O. No. 12, 14 D.A.C. In.
Wat.-F. No. 6 D.A. Pillar Cam.
Ferracute No. 105 D.A.
Terkelsen D-150 L. M. Spring.
Stahle No. 4-R S.S. Reducing.
W-P Long Stroke for shells.
Ferracute No. PG-P4.
Henry & Wright 25 & 50 ton
Dieing Machines.
Bliss No. 16, 4" str., Overh.

SCREW MACHINES

Grid, 9/16", 7/8", 1" Mod. G.
Clev. 3/8", 1/2", 5/8", 3/4", 2",
2 1/2", 2 3/4", 4 1/4" Auto.
B.&S. Auto.—most sizes (we
are specialists).
New Brit. 1x5", 1 1/2"x7" A.
Cone 3", 1 1/2", 1 3/4" Automatic.
Hand Screw M. of all makes &
sizes; W. & S., Foster, B.&S.
Potter & Johnston Nos. 5A, 6A
(Chuckers).

J. & L. 3 3/8 Steel Head.

MISCELLANEOUS

Broaches, LaPointe 1-2-3-4.
Burnishing Barrels, Abbott.
Goss & DeLeeuw Quadrant
Chuckers.

Hammers—Board Drop, must be
moved.

Headers, many sizes & makes.

Lapper-Norton 15C.

Measuring Machines, P.&W.

12", 24" & 48".

Planer—Sellers 54"x54"x18"—4

Head, m.d.

Rolling Mill, Robertson 12"x12"

for non-ferrous metal.

Shapers—from 7" to 32".

Shear—Niagara 10"-14 Ga.

Tapper—Threadnut No. 2

auto. nut.

Wire Formers, Nilsson & Baird.

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NEW HAVEN, CONN.

IF WHAT YOU WANT ISN'T HERE *Send Us Your Inquiry*

BRAKES:

No. 183 Chicago 6 ft. 12-ga.
No. 614 Chicago 6 ft. 14-ga.
No. 618 Chicago 6 ft. 18-ga.

DRILLS:

Radial, 3 ft. Fosdick.
Nateo Type K 20-spld.
Rail. Foote-Burt Nos. 2 & 4, 4 spld.
Prentice, 4-spld.
Allen BB Type B spl. spld.
Desmo DAH BB, MD.
36" Cincinnati BG PF SL.
25" Rickford, G. & E.; Slid. Hd.,
P. F.
20" & 24" Prentice BG.

GRINDERS:

Disc, No. 6—20 Bealy.
Disc, No. 220 Badger & press.
Disc, No. 41; Bealy 20", M. D.
Drill, New Yankee, D. E.
Internal, Madison; No. 65 Heald.
Surface, No. 210 Heald 8".

HAMMERS:

50-lb. Little Giant MD.
40-lb. Bradley Helve.

LATHES:

26"x12" Putnam Pacific type, DBG.
Semi-QCG, T. A. 26" Chuck.
18"x36" Rahn & Mayer.
18"x8" Lodge & Shipley MD.
15"x6" Flather, S. B. C.
14"x6" Lodge & Shipley.

LATHES—Turret:

16" Type A Gisholt, 6 1/4" hole.
21" Type H. Gisholt, 3 1/2" hole.
24" Type I Gisholt, 4 1/2" hole.
24" Type I Gisholt, 4 1/2" hole.

MILLERS:

No. 1-B Kearney & Trecker Plain.
No. 2 LeBlond, plain, M. D.
Nos. 2 & 3 Kemp Smith, plain.
No. 25 Becker-Brainard.
No. 3B Owen, DH, Vert. alt.
Pratt & Whitney, 2" spline.

PRESSES:

Hydraulic, 42-ton Elmes.
OBI, No. 0, 3Loshough-Jordan.
O. B. L., No. 30 Swaine.
Foot Press, No. 4 Swaine.
Str. Side D-44 Presto.

PUNCHES & SHEARS:

Queen City DE. 1/2 in 1/2", M. D.
Rock River L. 1/2 in 1/2", 24 thr.
Cleveland C. SE. 3/4 in 3/4", 26 thr.
No. L-10 Badger, DE. 1/2 in 1/4".
No. 14 1/2 W.W. 25 1/2 thr.; m. d.
No. 54 Beloit S. E., 3/4 in 3/4".

SHEARS:

Jig, GEM, 18 ga. cap., M.D.
Rotary Bevel, Leunox 3/4".
Square, Stark 9"; 18 ga. cap.

THREADERS, Pipe & Bolt:

Murphy, 3/4" dbl. head, bolt.
Pipe, 2" Oster M. D.

MISCELLANEOUS:

Bender, No. 15 Wallace.
Dbl. Seamers, Swain.
Compressor, H-B CCB, 14x9x8,
20 HP motor.
Groover, 30" Toledo.
Planer, 30"x30"x8" Pease and
Wheeler.
Metal Band Saw, 14" Racine.
Rolls, 10" Pyramid, 1/2" cap.
Saw, cold, No. 2-B Cochr.-Bly.
Shaper, 20" Smith & Mills.

Brown Mch. Co., 2333 N. Ninth St., St. Louis, Mo.

"INTERSTATE HAS IT"

ANGLE IRON SHEARS

Covington, 6x6x3/4" double end
No. 2 H. & J. 6x6x3/4 on turntable
Fels Angle & Beam Shear, 8x8x3/4

AUTOMATIC SCREW MACHINES

No. 60 B. & S. Ser. No. 9800
2 1/2" Cleveland Model A. sq. pan.

BORING MILLS

12" Niles Cyl. Boring Mach. D. S.
88" Niles Vert., 2 heads, M. D.
42" N.B.P. s.p.d.; 42" Gisholt Vt.
52" Bullard, 52" Bausch
Rochester Horiz., 3" bar
60" Niles, 4 1/2" N. B. P., Dual Con.

BRAKES

Hand: Chicago Steel 10x14; 3'16;
4'12; 8'18; 8'16; 8 & 10'16
Box & Pan: Chgo. St. 4', 5', 6',
8' 14 ga.; 4'10; 6'10

BRAKES: POWER

Chgo. Steel: 12'3/16" 1", 10'
12'14" 8'10; 8'12; 6'10;
6'12; 3'3/16"

DRILL PRESSES

Leland Giffords, 1 to 4 spdl.
6 sp. Edlund, P. F. No. 2B Ed-
No. 2 Bausch Mul., 22 sp.
Allen High Speed, 1, 2 and 3 sp.
5 spindle Detroit Horiz., M.D.
No. 3 Avey High sp. B.B., M.D.

GRINDERS

16x66 Landis, No. 12 B.&S.
84" diam. face, m.d.
Springf. Pl. Type Table 24x50"
No. 3 & 4 Gallmer & L., M.D.
No. 2 B.&S.; No. 3 Abras.; 8"
Arter rot. No. 33 Abrasite.
No. 3 Diam.; 12x48 m.d.

IRONWORKERS, (12) Smith & Pels, 3x3x1/2" & 4x4x1/2" & 6x6x1/2"

LATHES

Hardinge, Precision, 1" & 1/4" cap.
36"x20" New Haven
9"x3 1/2"; 16"x8" P. & W., Q. C. G.
24"x12" Reed P. Grd. Hd T.A.
36"x30" L&S 24" cent. qsg; 48"
18"; 24/48 McCabe Dbl. Spindle;
14"x6"; 18"x8" Monarch
38"x20" Harrington

LATHES, Turret

No. 4 & No. 6 W. & S. cone; No.
3 Foster, g.h.; No. 4 W. & S.
No. 9 Bardons & O., No. 8 Foster

PLANERS

26"x8" Cleve. Opensl.; 48"x48"x2
12' Belmar, 4 hds.
36x12 Openside Dietrich & H.
20" Niles Plate Planer

MILLERS

No. 21 Brown & Sharpe Plain
No. 1Y R.&S. Horiz.; No. 3 B.&S.
No. 2, 3, 4B, 5B Becker Vert.
Ingersoll Planer Type—36"x168";
48"x22"—4 hds., 40 HP. Mtr.

PRESSES: OBI

5 & 6 Toledo (3); No. 5 Cons.
No. 20 Bliss; No. 40 Perkins
No. 4 Nia.; No. 3 Toledo; No. 5
Bliss Horizontal, 8" str.

PRESSES—O.B.I. (Cont.)

No. 5 1/2 Walsh; No. 6 1/2 Tol. B. G.
No. 3 Niagara (5); No. 2 Rockfd.
No. 4 L. & J.; No. 75B Toledo

PRESSES: Double Crank

No. 96-G Toledo, 146" betw. upr.,
24" str., tie-rod, wt. 162,000 lbs.
No. 24-E Bliss 60" between
No. 8-A Bliss; No. 68B Nia. air
cushions, No. 93-B Toledo
No. 138A Stoll, 38" bet. uprights
No. 1D Bliss, 4" stroke

PUNCHES: Multiple Gang

No. 6 Nia.; W. & W. No. 35,
No. 30A, No. 32

PRESSES: Horn

Toledo, No. 14, No. 42, 43-P
Nia. No. 15, No. 116; Bliss No. 39,
No. 21, No. 40
No. 25 1/2 Bliss B.G. Swing Table

PRESSES: Deep Throat

Toledo No. 17, 20" thr.; No. 15

EXCEPTIONAL TOOLS GRINDERS

No. 2 Cln. Centerless
No. 2 Ohio Univ. Mill
No. 16 Blanch., sur., 36" ch.
No. 25 Landis Cyl 24"x144"
No. 25-A Heald 24"

LATHES: Turret

No. 5 Foster Timken Bearing,
Hydr. Feed; Like New
W. & S. Univ.; No. 2A, 3-A;
No. 4 M.D.; No. 4 Gd. Hd.

LATHES

30" Pitt Lathe, 156" face plate
18"x10" L&S, gd. hd., m.d.
Model B. P. & W. 20"x10"
Model Room, Motor in Base
16"x8" Am. Grd. Hd.; 12spd.H.

JIG BORER

No. 2 Pratt & Whitney, M.D.

VERTICAL MILLS

No. 4 K. & T. Timken Bearing;
No. 2 B. K. & T. S.P.D.

MILLS—BORING

42" Bullard New Era
24" Bullard Rap. Prod.
4 1/2" N. B. P. Dual Control

RADIAL DRILL: 5 Ft. Fos-
dick Economax-Mtr. on Arm

PRESSES: Straight Side

No. 66 Cons., 8" str.; No. 55 C.
No. 57 Toledo, 8" str.; No. 59 T.
No. 6 Walsh, b.g., 5 1/2" stroke
No. 74W Bliss Wedge type

No. 832 Verson All Steel 250 ton,
12" str., Marquette air cushion.
No. 78 1/2 Bliss, 24" str.; No. 78 1/2
Bliss, 12" & 14, str.; 77 1/2 Bliss

PRESSES: Toggle

Bliss No. 3 1/2 A.; No. 1 1/2, No. 5, No.
5A, No. 16 1/4 Toledo
No. 409 Bliss, 108" bet. upr.

PRESSES: Coining

No. 27K Bliss 1000 ton
600 Ton Waterbury Farrel

PRESSES: Hydraulic

Woods, 150 ton, 49" bet. upr.
400 ton Watson, S., 2-10"
38"x62" between columns
3000 Ton Hydr. Forging P.
400 Ton Southwark 30" dia. I.

PRESSES: Stiles or Solid Back
Ferraccio, P2, P3, P4, P6
Bliss No. 4, No. 83, No. 4N,
Toledo No. 34P, No. 36 B.

FREE BRAKES

Verson All Steel, 60"x14 ga. d.
10' 10 ga. Cin. 12' on die

RADIAL DRILLS

6' Am., 5' Fost.; 4' Hammond
N. B. P. 4' Hammond

RIVETING HAMMERS

No. 2A, 5A & 5 1/2—B. H.

ROLLS: Bending

8' 1/4" Beloit; 22 ft.x11" Im
8x3 1/2" Niles, drop end; 6' & 8'

Rolls, Angle Bending, 4x4x
Excelsior 22x1 1/2"

ROLLER DIE MACHINES

7-Spindle, Adj. M.D. 5 Sp. Y.

LEVELLERS, ROLLER

48" 17 rolls, M.D.; 38" Hilles
54" McKay 17 Rolls, M.D.

SAWS

No. 0, 1 & 2 Bryerson F.
Hack Saws; 13x16" Peerless;
6", Band No. 8 Marvel

Hydraulic Scrap Baler 150 H
bales, Gailand & Hennin
66" x 16 1/2" x 24"

SHAPERS AND SLOTS

20" Queen City; 16", 24"
and 32" G. & E.; 20" G.
24" American SPD thru gear
24" Bement Slotter

SHEARS: Power and Foot

10' 3/8" Nia. 5" gap
10'18ga. Nia. 6'10 ga. Rob.
Bertsch 10'3/16; 13' 3/4" Unit
10'3/16" Chgo. Steel, M.D.
10' 10ga. Rob. 10' 4 Nia.18"
10' 3/4" United Eng.; 5' 1/2" Tol
12' 14 ga. Streine; 12' 10"
Alligator No. 1 1/2 D. & K. Mills
Rotary Quickw., 60" thr. 14" a
No. 25 Capacity 7/32"

Throatless 10 ga. 16 ga. 18 ga.
Foot Shears, 20", 30", 36", 42"

MISCELLANEOUS

Air Compressor 10x10; 14x12
Column facer, 48" Newton, M.
Filing Mch., No. 3 Thiel, M.D.
Furnace, Elec., Large Pusher
Gear Hobber, No. 16 H.S. G.
Gang Slitters, 32", 36", 48"
Keysaters, Nos. 2, 3, Mitts &
Lathes: Spin. Pry. 22, 24, 26,
Pipe Threaders, 2" to 10"
No. 4, 8 Gaterman Pen., Tap
Tumbling Barrels, 32"x44"
Upsetter 3 1/2" Ajax
Welder, Spot—100 KW Fed. F.

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2" Model B Cleveland S.P.D. Automatics.

No. 454 New Britain Chucking Machine.

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(2) 4" Cleveland Model M 4 Spdle. Chuckers, Like New.

No. 20 Pease Continuous Automatic Blue Print Machine, M.D. with Tank & Drier.

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93"x10" dia. Pyramid Type Plate Rolls.

12" Pyramid Type Plate Rolls, 12"x14" dia.

16"-20"-28" Gould & Eberhardt Shapers.

2" Buffalo Armor Plate Bar Shear.

¾" Shuster Wire Straightener with 4' Cut-off & 10 HP Motor.

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No. 4 KEMPSMITH UNIVERSAL MAXIMILL MOTOR DRIVE 15 H. P. 3 phase motor, Rapid Traverse—16" Index Centers.

D-31 FOX MULTIPLE DRILL, RECT. HEAD, 16"x31½" spindle centers. Bored for 36 spindles. Has ten 1¼ No. 2 Taper spindles. Power feed to head.

AUTOMATICS, Several Model A Clevelands, from ½" to ¾" bar capacity.

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DIES and EQUIPMENT to make square cans, pt., qt. & gal. size.

DRILLS, 36" Cincinnati back geared, sliding head, tapping attachment.

No. 2 Colburn Manufacturing; 36" Snyder, back geared.

No. 12 Minster H. D.; 24" Barnes All Geared Self Oiling belt drive.

GRINDERS, 12"x72" Landis M. D.; No. 78 W. & M. Surf. M. D.

LATHES, 38"x14' Fifeild—Cheap; 16"x8' Sidney, double back geared, quick change; 14x6 Carroll Jamison; 18"x8' Lodge & Shipley, Geared Head.

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PLANERS, 30"x30x8' Cincinnati, two heads on rail; 36"x15' Betta, 2 heads.

PRESSES, No. 1 Bias Cam Drawing Press, (2) No. 3 Minster

RADIAL DRILL, 2' American, gear box drive; 3' Cincinnati-Bickford cone drive.

SCREW MACHINES, No. 4 Warner & Swasey plain screw machine,

No. 4 Milholland; No. 4 Foster cone head.

1½"x9"; Acme cone head; No. 5 Foster grd. head—No. 4 Warner & Swasey grd. hd. SHAPER, 28" Kelly B. G. Single pulley drive, 10 H. P. A. C. Motor.

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No. 3A W. & S. Univ., 4½" bar cap., auto. chuck and bar feed

No. 2A W. & S. Universal, chucking

No. 4 W. & S. Universal, geared head

No. 6 Warner & Swasey, geared head

No. 1, 2, 4, 6, 8 Warner & Swasey

No. 1B Foster Univ., Timk. Bearings

Gisholt Simplimatic, m. d.

No. 2 Gisholt Turret, m. d. in base

No. 3 Gisholt Geared Head, m. d.

No. 2 Bardons & Oliver Geared Head

4½" Bardons & Oliver Grd. Head, m. d.

No. 3 Foster, m. d. in base, Timken

No. 5A, 6A, 6D Pot. & J. Auto., m. d.

21", 24" Gisholt Turret

No. 1 Foster Tur., m. d. in base, lat. type

4 sp. Grid. Mod. F Auto., m. d. 2¼" cap.

1½x18", 2x24", 3x36" P. & W. Tur., cone

2 sp. 3x36" J. & L., st. hd., m. d., late type

2x24", 3x36" Jones & Lamson, m. d.

3¼", 4½" Gridley Automatics

16", 18", 20" Acme Turret, cone

No. 3 Acme Universal, m. d.

3½x36" Acme Flat Turret, m. d.

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6", 11" Gleason Gear Generators

36" Gould & Eberhardt Gear Cutter

No. 16HS, 18HM G. & E. Gr. Hob., m. d.

No. 3, 12 Barber-C. Gear Hobbers

No. 12 Barb.-Col. Gear Hob., dbl. over.

16" Cincinnati Gear Hobber, m. d.

No. 1 Lees-Bradner Gear Hobber, m. d.

No. 5A Lees-Bradner Gear Gener. m. d.

No. 3-26", 3 Heavy, 6-60", 6-72" B.&S.

Gear Cutters, m. d.

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No. 2, 4, 22 Colburn Mfg.

No. 216, 220, 310, 314, 315 Baker

D2, D3, D4 Colburn H. D.

No. 14 Colburn H. D.

No. 217 Baker

24" and 36" Cincinnati Bickford

32" Aurora

26" and 28" Barnes

PLANERS

55"x55"x30" Betts, rev. m. d., 2 heads

54"x42"x12" G. A. Gray, rev. m. d., 4 hds.

48"x48"x18" Diet. & H., rev. m. d., 4hds.

42"x42"x24" Cincinnati, m. d., 2 heads

39"x39"x10" Cinc. Forge Type, 2 heads

36"x36"x12" Niles, m. d., 4 hds., box tble.

36" wid. to 42"x12" Cinc., rev. m. d., 3 hds.

36"x36"x12" Fitchburg, m. d., 3 heads

32"x32"x8" Gray, 1 head

30"x30"x12" Gray, m. d., 2 heads

30"x30"x10" Cincinnati, 2 heads

30"x30"x8" Pond, 1 head

24"x24"x6" Smith & Silk, m. d., 1 head

24"x24"x6" Ohio, 1 head

24"x24"x6" Gray, m. d., 1 head

24" Cincinnati Crank, m. d., 1 head

BORING MILLS

2-72" Cincinnati Rapid Production, m.

d., 2 heads, heavy pattern

2-36" Bullard New Era, m. d., 1 rail

head, 1 side head

30" Gisholt, cone

42" Gisholt, gear box, 2 heads

42" Niles, gear box, 2 heads

42" King, m. d., 2 rail, 1 side head

3-42" King, m. d., 2 heads on rail

51" Bullard, m. d., 2 heads

10" Niles, cone, 2 heads, old type

MILLING MACHINES

No. 2 Becker Vertical, rotary table

No. 6 Becker Vertical, cone

No. 2A Milwaukee Pl., double overarm

No. 2 Rockford Plain, m. d.

No. 5 B. & S. Vertical, cone

No. 4 Knight Vert., m. d. in base, with

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No. 2A, 4A B. & S. Universal, m. d.

No. 1, 2 Cleveland Plain, s. p. d.

No. 2 Van Norman Duplex, belt

No. 2, 3, 4 Cincinnati Plain, cone

No. 3 Kempsmith Plain, cone

No. 4 Kempsmith Maximiller, m. d.

No. 5B Heavy B. & S. Plain, m. d.

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48" Cincinnati Duplex Worm Driven

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48" Oesterlein Tilted Offset, m. d., Tim-

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Full Automatics or Turret Formers.

3 $\frac{3}{4}$ " and 3" Model "B" National Acme 4-spindle.

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24" Bullard New Era, S. 12, 105

36" Bullard New Era, S. 9081

42" Gisholt

42" King

42" Colburn

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No. 31 Lucas, 3" bar

31" Rockford

3 $\frac{1}{2}$ " Det. & H. fl. type, ar. M.D.

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No. 2 Brown & Sharpe, M.D.

No. 3 Abrasive, M.D.

No. 2 Type B Diamond, M.D.

No. 16 Blanchard Vertical, M.D.

No. 16A Blanch. Auto, 3 M.D.

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12"x0" Hen. Y. Hd., tap. att.

14"x5" American Geared Head

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28"x48"x16" McCabe Dbl. Spd.

26"x48"x24" McCabe Dbl. Sp.

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6"x14" Pratt & Whitney Thrd.

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6"x80" Pratt & Whit. Thrd.

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No. 2A B. & S. Univ. M.D.

No. 3 Brown & Sharpe Univ.

24" Garrin Cam

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Large sel. B. & S's, h. spds.

full auto. and tur. formers.

9/16" Gridley, M.D.

1" New Britain M.D.

1"x5" New Britain M.D.

1 $\frac{1}{2}$ "x7" New Britain, M.D.

Several—No. 6A Pot. & J. Ch.

61" Model B. Cleveland

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21"x24" J. & L. Steel Head

31"x36" Acme

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spd. hd., Timk. Sp., Arr. M.D.

No. 4 War. & S. Grd. Hd., 12

speed head, arr. M.D.

No. 6 Warner & Swasey G.F.H.

No. 6 War. & S. Grd. Hd., M.D.

3"x36" J. & L. Steel Hd., M.D.

No. 3A W. & S. Univ. Hol. H.

No. 3AL Gisholt M.D.

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26"x71" L. Grd. Hd., ar. M.D.

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Bending & Straightening Ma-
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Stroke 48", Bet. Frames 90".

75 & 100 ton Henry & Wright Die-
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Cap. 3" Round bars, $2\frac{1}{2}$ " Square
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Tishken Strip Straightener & Cut-
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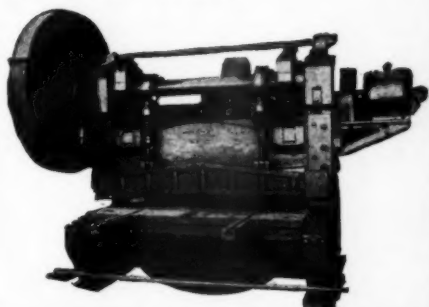
60" x 24" x 18" Ingersoll double
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Two polishing heads, feed table
7' long.

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Excellent Condition

24"x15"x7½—16 gauge. Olive Green Finish.
Drop Handles Both Ends. Weight 16 lbs.

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high speed, magazine feed.

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No. 00 B. & S. automatic Screw Machines (2)
No. 00 B. & S. automatic Turret Formers (10)
No. 2A W. & S., univ. Tur. Lathe, Timken.
covered ways, taper, motor dr., 3½" bar and
equipment; full chucking equipment.

24" Libby (International) Turret Lathe, 4½"
hole, extra long bed.

No. 1B Foster universal Turret Lathe.

No. 4 W. & S., univ. G. F. H. bar equip. (2)

No. 6 Warner & S., G. F. H. bar equip. (3).

No. 4 Warner & S., G. F. H. bar equip. (3).

10"x72" Norton Cylindrical Grinder.

No. 1 Davis Keyseater.

No. 2A B. & S. univ. Mill, s. p. d. full equip.

No. 3 Van Norman Piston & Cyl. Grinder, m. d.

6" Am. trp. purpose Rad. Drill, d.c. mtr. on arm.

3" Holden-Morgan Thread Millers (6).

LAKE MACHINERY CO.

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6½—16" American T. P. Radial Drill.
3½—9" American Radial Drill, box table.
No. 2A W. & S. Universal Turret Lathe.
No. 3A W. & S. Univ. Turret Lathes, T. A.
10"x36" Norton Hyd. O. S. Surf. Grinder,
complete with chuck and motors.
10"x¾" cap. Shear, all steel frame, S. P. D.
26" Libby Turret Lathes, arranged M. D.
No. 6 Becker Vertical Millers.
F. B. Shuster ¾" cap. Wire Straightener.

No. 2 W. & S. Pl. Hd. Screw Mch., A. C.
& B. F., P. F. to turret.
No. 1 W. & S. Pl. Hd. Scr. Mch., A.C. & B.F.
No. 2 B. & S. Wire Feed Screw Machine.
No. 0 Foster Pl. Hd. Scr. Mch. A.C. & B.F.
16"x6" Rock. Q.C.G. Lathe 3 & 4 jaw Chucks.
17"x8" LeBlond Q.C.G. Lathe, 4-jaw chuck.
18"x16" L. & S. Q.C.G. Lathe, taper att.
No. 96—63" Toledo 450-ton Dbl. Crank,
Straight Column Press.

MOSER MACHINE TOOL SALES, 1608-12 W. CLYBOURN ST., MILWAUKEE, WISCONSIN

NEW 3 Phase B. B. Motors ½ to 25 H. P., 5 H. P. \$55.75

DRILLS

20" Lever, Wheel & Lever and Power Feed.
24" and 28" sliding head, back gear, power feed.
Bausch Multiple 16 spindle No. 1 Morse Taper.
4 spindle Foote-Burt, heavy duty.
6 spindle Hole Hog No. 1 Morse Taper, power fd.
1, 2 and 4 spindle high speed 8" overhang.
5" Bausch Radial Drill.
59 other drills of various sizes and types.

MISCELLANEOUS

Brake, Robinson, toggle 6'.
Brakes, 6' and 10' for 18 gauge.
Grinders, cutter and cylindrical, plain and univ.

This is only a partial list of our large stock, which is constantly changing. Write for what you need.

THE OSBORNE & SEXTON MCHY. CO., Dept. H. COLUMBUS, OHIO

Grinders, Bryant deep hole chucking.
Broaching machine, No. 1 LaPointe.
24"x12" South Bend Lathe, with raising blocks.
31 other lathes 10" to 24" swing, 5' to 14' beds.
Milling Machines, Nos. 1½, 3 and 4 plain.
Milling Machine, 20"x20"x8" Ingersoll Slab, m. d.
Milling Machine, No. 1 Bilton, automatic gear.
National Acme Automatics Nos. 52, 53 and 55.
Shapers, 16", 18", 20" and 24" b. g. crank.
Turret Lathes, 21" and 24" Gisholt, m. d.
Planer, 36"x36"x14" Gray Standard Pattern.
Press, No. 24 Toledo double acting cam drawing.
MOTORS, REBUILT 3 Phase ½ to 50 HP various speeds.

BORING MILLS, Horizontal

- 3 1/2" Bar P & H No. 12 Floor
4" bar Gisholt, knee, M.D.
5" Barrett No. 2 Cyl. Borer.
8" bar Beaman Smith, Floor

BORING MILLS, Vertical

- 82" Pond, Heavy Duty
72" Pond, A.C., P.R.T., M.D.
60" Colburn, P.R.T., M.D.
60" Betts, M.D.
51" Bullard Cone or M.D.
42" Colburn, P.R.T., M.D.
30" Colburn, 1 Turret Head.

DRILLS, Radial

- 6" Amer. Univ. & Plain.
6" Mueller, Gear box, M.D.
6" & 5" Amer. Triple Purp.
6" & 5" Cincinnati. Bickford.
3" American, Sensitive.
2, 4 & 6 Spindle Allens.
4 Spindle No. 2B Edlund.
4 Spindle Kokomo, No. 3 M.T.
No. 22 1/2 Foote Burt.

GRINDERS

- 8"x54" Fitchburg Pl., m.d.
10"x36" Landis Plain (5).
12"x32" No. 2 Landis Univ.
12"x36" Landis Plain.
6"x32" Norton Plain.
16"x50" Norton Self Cont.
No. 6 Bryant Chucking
18" Besly No. 26 Disc.
24" Besly Disc M.D.
18" Badger No. 220 Disc.
No. 16 Blanchard, Floor, M.D.
No. 11 Landis Tool & Cutter.
No. 33 Abrasive Surface.
No. 55, 60 and 65 Heald Cyl.
14" P & W Surface M. D.
No. 2 B. & S. Surface M. D.
Heim, Centerless.

LATHES

- 14"x6" Cisco t.a., draw-in.
14"x0" Monarch, q.e.g., cone.
16"x8" Greaves K., Q.C.G.
16"x8" Hender Cone, T.A.
16"x8" Prentice, Grd. Hd.
16/18"x8" Am., Q.C.G., Cone.
18"x8" Amer. Grd. Hd. (2)

LATHES (Continued)

- 18"x8" Advance, Q.C.G.
18"x8" Lodge & S. Cone.
19"x8" LeBlond, Cone.
20"x12" Greaves K., T.A.
20"x10" Greaves Kinsman.
20"x12" New Haven, T.A.
22/24"x8" Lodge & S., cone.
24"x10" American Cone
24"x19" American L. C. G.
24"x14" L & S T.A., Cone.
36"x10" Pond, Q.C.G., Cone.
26"x12" Bridgeford, Cone.
26"x16" Bridgeford Grd. Hd.
27"x38" Lodge & Shipley, M/D
28"x12" Boye & Emmes.
32"x14" Boye & Emmes, Cone.
32"x17" Ffield, triple grd.
32"x22" Schumacher Boye.
36"x14" Pond, Grd. Hd., M.D.
42"x18" Pittsburgh, Q.C.G.,
Cone
42"x20" L. & S. Cone, Q.C.G.
42"x30" Johnson Grd.Hd.M.D.
46"x32" H.S. & G. Grd. Hd.
48"x36" Ffield, m.d.
60"x25" Gleason hvy. duty.

MILLERS

- 18" Cincinnati Duplex 24" table
18" Cincinnati Duplex 36" table
No. 2 Cincinnati Pl., Cone.
No. 4 LeBlond Pl. Cone, M.D.
No. 6 Becker Vertical.
Model B Becker, Vert. S.P.D.
Model C Becker Vert. S.P.D.
Model CS Becker Continuous.
24"x24"x12" Ingersoll Adj.
Rail Planer Type.

PLANERS

- 72"x72"x18" D&H Openside.
60"x60"x18" Pond, Rev. M.D.
60"x60"x16" D & H Openside.
48"x48"x12" D&H Openside.
42"x36"x10" Gray, 2 Hds.
42"x36"x20" Cincinnati, 3 hds.
30"x30"x9" Cincinnati, 2 Hds.
24"x30"x6" Cincinnati, 2 Hds.
36" Newton Rotary, M.D.
30"x30"x10" D. & H. Openside.
30"x30"x8" Powell 2 hds.
27"x27"x6" W. & P., 1 Hd.
24"x8" Gray; 24"x7" Niles.
24" Lynd Farquhar Openside.

TURRET LATHES

- 3 1/4"x36" Cincinnati Acme, Grd. Hd.
3 1/4"x36" J & L Steel Head.
No. 3 Foster Cone.
No. 5 Foster, 1-13/16" bar.

TURRET LATHES (Continued)

- 21" Gish. 3 1/2" H.S., 2 cone
24" Gish., 6 1/2" H.S., A.C., M.D.
24" Gish., 6 1/2" H.S., 2 cone.
28" Gisholt M.D.
1 1/2"x18" Pratt & Whitney.
2 1/4"x24" & 3"x30" J. & L.
No. 2A Warner & Swasey Univ.
No. 4 W. & S. Cone.

MISCELLANEOUS

- Automatic, 2 1/2" Gridley, 1 Sp.
Automatic 2 1/2" Gridley 4 spin.
Billiet Breaking Mach., Ajax.
Bolt Threader, 1 1/2" Landis.
Bolt Threader, 2" Landis.
Brake, 8'6"x1 1/2" Chicago Press.
Broach, No. 3B LaPte. M/D.
Chucking, Nos. 34 & 23 N. B.
Flanger, 1 1/2" McCabe Pneu.
Gear Cutter, 110" Newton Spur
Gear Planer, 24" Gleason.
Gear Hobber, 6" Pfauter.
Gear Generator, 11" Gleason.
Header, 1 1/2" Acme Rivet.
Header, 2" Acme, Steel.
Keysters, No. 1 Bak., No. 1 Dav.
Koyseal, Nos. 2, 3 & 4 M&M
Nibbler, No. 3 Gray 1", 36".
Pipe Mach., 4" Landis, M.D.
Pipe Machine, 8" Williams.
Pipe Machine, 12" Saunders.
Pipe Mach., 12" Curtis & C.
Pipe Mach., 2" Bignall Keeler.
Press, No. 8 1/2 Z & H Percussion
Press, No. 61 Spec. V & O.
Punch & Shear No. 47 PBC B.
Punch 54" H & J No. 2 D.E.
Punch, 36" Whit. 3"x1".
Rolls, 8"x1" H&J No. 2.
Rolls, 14"x1" Wickes
Rolls, 20"x5/8" H & J No. 6
Saw, 6"x6" Peerless Hack.
Saw, 9"x9" Peer Hack, M/D.
Saw, 6" Arey Milband.
Saw, 6" Gorton No. 2B Inter.
Saw, 12"x15" Racine M/D.
Shaper, 16" American, Cone.
Shaper, 24" Gould & Eberhardt
Shapers, 24" & 20" Queen
City M.D.
Shaper, 16" Ohio, M/D.
Shaving Mach. P. & W. Vert.
Shear, 30" Cleveland, No. X.
Shear, 8'x1" Hilles & Jones.
Shear, 156"x1 1/2" United, 36" s.
126"x1 1/2" Amer., 22" Gap.
126"x1 1/2" Niagara, 18" gap.
Slotter 15"-18" Dill.
Slotter, 24" Newton, M/D

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3' Cincinnati Bickford Super Service, motor-on-arm, enclosed head. **SAME AS NEW.**

POWER PRESS BRAKE

6' $\frac{1}{4}$ " cap. Cincinnati, A. C. Motor Drive, late type. All steel construction.

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6' & 10' Dreis & Krump, Chgo., 14 ga. cap. All steel Const., A. C. Motor Drive.

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No. 7 Foster, geared head, over 70,000 serial, bar feed, S. P. D.

Grinder, hand surf. Manhattan, No. 1. Grinder, surf., No. 2 B. & S., auto. Hack Saw, 6x6 Peerless, high speed. Lathe, engine, 30x18' Houston Stanwood & Gamble.

Lathe, engine, 20x8' American.

Lathe, Putnam, 26x14', Complete.

Lathe, Cisco, 22x13', geared head, 12 speed, M. D., T. A., Complete.

Lathe, American, 14x6', geared hd., M. D., Complete.

Milling Machine, No. 2 Ohio, plain.

Punch Press, No. 5 Bliss Cons., O.B.I.

Shapers, 17' Averbek 17' S. & M., Back Geared.

Shapers, 16' Queen City, 16' Kelly, Back Geared.

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Special Offerings

Slightly used 6' American plain radial drill, 17" diameter column, Timken bearings, 15 h. p., a. c. motor on arm.

Alligator Shears (2), Lewis, capacity 3" and 5" round, 18" and 24" blades.

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speed, $\frac{1}{2}$ " capacity, 36 speed countershaft.

Gridleys— $\frac{1}{8}$ " Model "G", motor drive.

National Acmes— $\frac{1}{8}$ "², 1" and 1 $\frac{1}{2}$ " Model "C"

Five Spindles, motor drive.

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with lot of extra equipment.

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c/s drive.

Brown & Sharpe—No. 10 Pl., self-contained, S.P.D.

serial 237.

Brown & Sharpe—No. 11 Pl., self-contained, S.P.D.

serials 1108, 1353 and 1800.

Baker—No. 3 Contour, motor drive.

MISCELLANEOUS.

No. 1 $\frac{1}{2}$ " Bliss Toggle Press.

No. 12 Pratt & Whitney Profiler, Motor Drive.

Hammond Radial Drill, ball bearing.

No. 0Y Brown & Sharpe Millers, Motor Drive.

No. 3A Brown & Sharpe Universal Millers, S. P. D.

with dividing heads and vertical attachment.

No. 2 Cincinnati Plain Millers.

No. 2SL LaPointe Hydraulic Broach, Mche., m. d.

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HIGH GRADE TOOLS FOR QUICK DELIVERY

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- 14"x6' LeBlond Grd. Hd. S.P.D.
- 14"x6' & 16"x6' LeBlond 3 S.C.D. D.B.G.
- 21"x10' LeBlond, 3 S.C.D. D. B. G.
- 25"x16' LeBlond, 3 S.C.D., D.B.G.
- 24"x12' American Geared Head, S.P.D.
- 18"x8' American Grd. Hd. Lathe, S.P.D.
- 20"x8' American, 3 S.C.D. D.B.G.
- 20"x16' American, 3 S.C.D. D.B.G.
- 2-18"x8' Lodge & Shipley Grd. Hd. M.D.
- 2-20"x8' Lodge & Shipley Grd. Hd. M.D.
- 30"x16' American Geared Head, S.P.D.
- 30"x20' Amer. 12 speed Grd. Hd. S.P.D.
- 36"x22' Lodge & S. Sel. Hd. S.P.D. Taper.
- 36"x22' Putman Geared Hd. S.P.D. Taper.

Planers and Shapers

- 24" Kelly Shaper, Cone drive.
- 24"x24"x6' Gray Planer.
- 30"x30"x16' Gray Planer.

Millers

- No. 3 Cincinnati Plain, 3 S.C.D.
- No. 3 Cincinnati H. P. Univ., 3 S.C.D., D.B.G.
- No. 4 Cincinnati Hi.P. Cone 3 S.C.D. D.B.G.
- No. 4 Cinc. H.P. Cone Univ. 3 S.C.D., D.B.G.
- No. 2 Cincinnati Plain Cone.
- No. 2 Kempsmith Cone, M.D.
- No. 3 Heavy Oesterlein, Cone Universal.

Grinders

- No. 33 Abrasive Surface M.D.
- No. 2 B & S Surface M.D.
- No. 1 Diamond Surface Grinder.
- No. 50, 550, 60, 65, 70 Heald Internal.
- 6"x18" Landis Plain, Self Contained.
- 10"x36" Landis Plain, S.C.
- 12"x36" Landis Plain, S.C.
- 12"x4" Modern Plain, Belt drive.
- 12" Pratt & Whitney Plain Surface Grinder.

SPECIAL

20' Covington Initial Type Bending Rolls, Belt Drive, Capt. 20' 6" x 1½" plate, Steel Rolls.

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- 16, 20, 24" G & E Shapers, cone drive.
- 32" Gould & Eberhardt, H.D., M.D.
- 16, 20, 24 and 28" Gould & E. Shapers, S.P.D.
- 20" Amer. Shaper, M. Mak. Tbl. & vise. S.P.D.
- 16" Ohio Crank Shaper, Cone drive.

Radial and Drill Presses

- 3' Fosdick, S.P.D.
- 3½", 4", 5", 6" Amer. Triple Geared S.P.D.
- 4", 6" American Triple Purpose S.P.D.
- 4' Morris Plain radial, S.P.D.
- 6' American Trip. Purpose, M.D.
- 21", 24" Cinc. B. Upright Geared Feeds.

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- No. 1, 2, 3 Adams Farwell Gear Hobbers.
- 18H Gould & Eberhardt Gear Hobbers.
- No. 11 B & S spur and bevel Gear Cutter.
- No. 3-26", 3-36" No. 4-36" B & S Gear Cutters.
- Gleason Spiral Bevel Generators and finishers.

Boring Mills

- 42" Niles Bement Pond, Two Heads, S.P.D.
- No. 1 Barrett Horz. Mill.

Turret Lathes

- No. 1 Foster, Cone drive.
- No. 1B Foster, Grd. Hd.
- No. 4 & 6 W & S Plain Cone Drive.

Miscellaneous

- Model W Cleveland Pch. & Shr. 60" thrt., M.D.
- 1" Ryerson Lennox Rotary Bevel Shear M.D.
- 8"x¼" Chicago Bending Brake.
- 6"x3/16" Chicago Bending Brake.
- 5"x10 gauge V.K.V. Press Brake.
- 10"x3/16" Shall Power Squaring Shear M.D.
- 6"x6" Peerless Shaping Saw.
- 13"x16" Peerless Power Hack Saw.
- 8"x3/16" Capt. Toledo Power Squaring Shear.
- Gap.

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Automatics, No. 60G Brown & Sharpe, M. D.
 Band Saw, No. 8 Marvel Metal, Motor Drive.
 Drills, 4 spindle Aveymatic & Leland-Gifford.
 Grinders, Surface, No. 2 B. & S.; No. 2 Reid.
 Grinders, Disc, No. 27 Gardner, Motor Drive.
 Lathes, 14"x16" American Geared Head.
 Lathes, 16x P. & W. Taper, Collets, Relief. Att.
 Lathes, 20"x8" American also other sizes.
 Lathe, 24"x16" Boye & Emmes T. A., Q. C. G.
 Miller, 2B Universal K. & T., double arm.
 Miller, 2B Brown & Sharpe Plain, M. D.

Punch Presses, O. B. I. Nos. 1 to 8.
 Punch Presses, No. 55 Cleveland S. S., 180 Ton.
 Punch Presses, No. 348 Bliss Toggle.
 Radial, 4' American Univ., Mtr. on Arm.
 Radial, 34' American, Maxi-Speed, motor on arm.
 Radial, 3' Cincinnati-Bickford, S. P. D.
 Radial, 4' Dreses, single pulley drive.
 Shapers, 24" Stockbridge, Motor Drive.
 Screw Machines, No. 4 Warner & S. G. H., M. D.
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24"x12' Boye & Emmes.
 20"x8' Lodge & Shipley.
 18"x12' Hendey.
 16"x10' Sebastian.
 16"x8' Cincinnati.

DRILLS, RADIAL

4' Western.
 4' Mueller.

PIPE MACHINES

6' Oster.
 12' Curtis & Curtis.

MILLING MACHINES

No. 1 Brown & Sharpe Univ.
 No. 1 1/2 Hendey Universal.
 No. 1B Brown & S., Plain.
 No. 2 Brown & Sharpe Plain.
 No. 3 LeBlond Plain.

PLANERS

26"x26"x8' Fitchburg.
 30"x30"x10' Pond.
 36"x36"x12' Bickett.

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16" Steptoe.
 20" Steptoe.
 24" Gould & Eberhardt.

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 36"x16' Putnam, b. d., triple grd., q. c.
 16"x8' L & S, grd. hd., mtr. dr.
 15"x8' Sidney, grd. hd., mtr. dr., taper

DRILLS

3 1/2' Morris plain radial, mtr. dr.
 3 spindle Allen B.B. sensi. belt dr.
 20 spindle Natco, mtr. dr. head 14"x27"

MISCELLANEOUS

3" Rockford-Barnes horiz. Drilling &
 Boring Mch., b. d., Table 24"x60"
 No. 4 Pratt & Whitney Vertical Die
 Sink. & Milling Mch., table 18"x72".
 2" Landis Pipe Machines
 18" Gould & E. Gr. Hob., cap. 30"x12"
 "G" Rock River Punch 24" throat cap.
 3/4"x3/4", motor drive

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Rebuilt Tools at Attractive Prices

14"x6" LeBlond lathe, Q. C. G., 3 step cone, D. B. G., standard equipment.

16"x6" LeBlond lathe, Taper Att., Q. C. G. 3 step cone, D. B. G., late type positive cross feed, standard equipment. New geared m. d.

18"x8" LeBlond lathe, Q. C. G., 3 step cone, D. B. G., standard equipment.

18"x8" American lathe, Q. C. G., 3 step cone, D. B. G., bevel head, standard equipment. New geared m. d.

21"x10" LeBlond Heavy Duty. Raising blocks for a 30" swing. Q. C. G., 3 step cone, D. B. G., standard equipment.

Also a large variety of used Stamping Presses.

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6" AMERICAN TRIPLE PURPOSE MAXI-SPEED RADIAL DRILL, 17" COLUMN. TAP. ATTACH. A. C. M. D. ON ARM THRU GEAR BOX. EXTRA RIGHT ANGLE BASE.

27K. 1000 TON BLISS KNUCKLE JOINT EMBOSING & COINING PRESS, 2 1/2" STROKE.

72"x54"x24" POND DOUBLE HOUSING PLANNER, TWO HEADS ON CROSS RAIL. TWO SIDE HDS., B. D.

54" BULLARD NEW ERA VERT. TUR. LATHE, SIDE HEAD AND 4 JAW CHUCK TABLE, A. C. M. D.

NO. 28 K. & T. UNIVERSAL MILLER. DOUBLE OVERARM, S. P. D. VERTICAL & SLOTTED HEADS.

NO. 4 W. & S. UNIVERSAL TURRET LATHE, 12 SPEED TIMKEN BEARING GEARED HEAD, A. C.

MOTOR IN BASE, TEXROPE DRIVE. CHUCKING EQUIPMENT.

DRILLS

5" Dresser Univ. rad., arr. m. d.

3 1/2" Morris rad. A. C. Mtr. Dr.

4 spindle Avey, B. B. 2 M. T.

4 spindle L-G No. 2 M. T. p. f.

1, 2 & 3 Sp. Allen, P. F. & T. A.

1 & 2 Sp. Demco, H.S.B.B.

21" Royld. Exc. Uppt. Pwr. Fd.

20" Barnes all-grd. self-oiling.

28" Cin-Bick, Tap. Att., Gr. Box.

No. C-5 Natco, 10 spindles.

No. 13 Natco, 16 Spindles.

No. 121 Baker, 1 1/2" Cap. M. D.

No. 17D Moline 4 Sp. Hole Hg.

GRINDERS

16" Person Arter rot. sur.

No. 11 B. & S. Plain, S. P. D.

No. 20 Heald rotary surface.

No. 7 1/2 Gardner, 30" Disc, B. B.

No. 3 Wil. & Mor. auto., surf.

No. 2 Brown & S. surface, b. d.

No. 1 Wil. & M. B. B. Hand Surf.

5 H. P. 18" Queen City Disc.

b. b., New.

No. 2 Heim Centertless, M. D.

No. 6 G. & L. Hyd. Sur. 12"x48"

Cap. A. C. M. D.

LATHES

1/2 & 3/4" Hardge. Bench, Collets.

9"x12" Sundstrand Mfg. grd. hd.

14"x6" Hendey, Q. C. G.

16"x54" Centers Amer. 8 Spd.

Grd. Hd., Q. C. G. S. P. D.

16"x6" Hendey QCG, Tap. Att.

16"x6" South Bend, q. c. g.

18"x8" Sidney q. c. g. Taper Att.

19"x8" LeBlond Rap. Prod. Mfg.

18"x10" Rahn-Larmon 12 Spd.

Grd. Hd. Motor in Base New.

20"x8" Sidney 16 Spd. Grd. Hd.

M. I. B.

20"x9" Hamilton, q. c. g.

20"x13" Cisco Grd. Hd., M. D.

24"x12" Schum. Boye q. c. g.

30"x16" H.S. & Gamble, q. c. g.

LATHES, TURRET

No. 2A W. & S. univ. hollow

hex. bar & chkg., s. p. d.

No. 2A W. & S. univ. hollow

hex. chucking eqpt., s. p. d.

No. 4 W. & S. univ. c. hd bar eqpt.

No. 4 W. & S. cone hd., collets.

MILLING MACHINES

6"x48" Pratt & Whitney Thread.

No. 3 Kemps, Pl. B. G.

No. 2 Kemps, Universal, B. G.

No. 2 B. & S. Plain, B. G.

No. 4B Becker, vertical.

20" Barber-Col. Rotary.

No. 2Y, B. & S. Pl., mtr. drive.

No. 2, Van Norman Sub Head.

No. 1 B. & S. Plain, cone head.

No. 1 Kent Owens B. B. Hand.

No. 1B K. & T Universal S.P.D.

PRESSES

No. 5 Bliss-Con. o. b. i.; Grd.

No. 4 Rock, & Walsh, o. b. i.; Grd.

No. 1 Bliss Cam, Fly & Grd.

No. 6 Fox "Superflex".

No. 62 Bliss S. S.

No. 3R Rockford. obinew.

30 Ton Lucas Forcing, M. D.

No. 93B, Tol. Dbl. Crk. Sgl. Grd.

Tie Rod. 4" Str. M. D.

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24" Cincinnati planer type.

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Nibbler, No. 2 Campbell, M. D.

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Riv. Hmrs. Nos. 1A, 2A, 3A.

3A H. D. & 5A High Speed.

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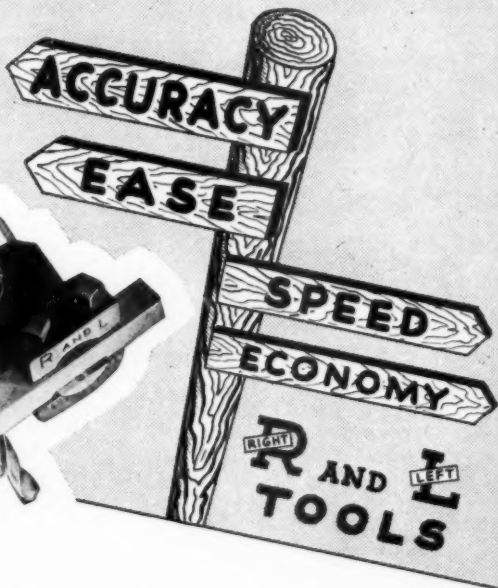
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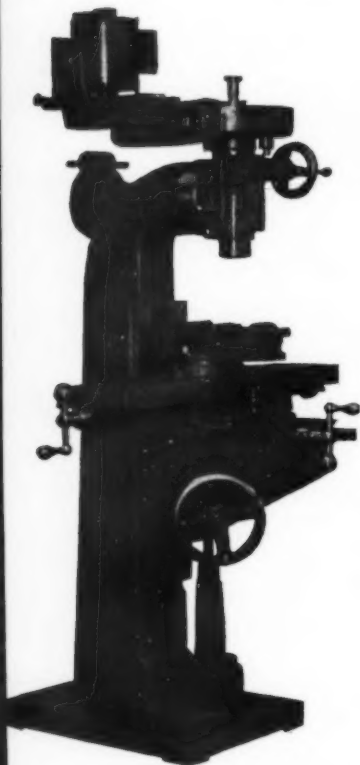
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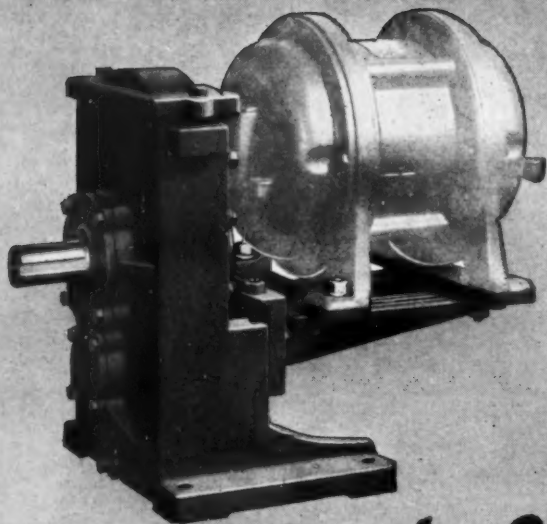
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